COMPUTERWORLD

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Readers Share Viewpoint on Ethics

eth·ics, eth'iks, n. pl., sing. or pl. in constr. A particular ethical system; the rules of conduct recognized in respect to a particular class of human actions.

Most people in the computer community apparently share the same viewpoint on "the rules of conduct recognized in respect to a particular class of human actions" or, in other words, the same ethical viewpoint toward their profession.

At least that conclusion can be drawn from the results of a recent *Computerworld* survey in which readers were asked to judge whether fictitious characters had acted ethically or unethically in two DP scenarios [CW, March 21].

The survey also showed DPers do care about the role of various DP jobs as they relate to the function of the employee and the employer's relation to society.

In addition, readers felt strongly about the need to preserve confidentiality of personal data, even in instances when not mandated by legislation.

Many also indicated the DPer's position — whether that of programmer or manager — carries special obligations to ensure no underhanded activity is being carried on since the consequences could affect either the corporation or the public.

The CW readers showed a fairly high level of consistency in their responses to three questions, with over 70% of the 335 respondents concurring in their judgments in two of the cases.

In the third case, the results were more evenly divided, because 36% of the respondents felt there was no ethical issue involved.

In the first scenario, readers overwhelmingly lauded the act of the programmer who, after failing to effect reforms by notifying management of a state department of health, retrieved his own medical data to show how security was lacking and then notified a state legislator.

Seventy-one percent, or 243, of the readers said his actions were ethical, while 21%, or 70, said they were unethical; 6%, or 20, found no ethics issue.

Many indicated they believed the programmer acted ethically only because he had first tried the avenues open to him within the department.

In the second scenario, which readers said sounded like the Equity Funding fraud, there was some confusion as to which programmers they were being asked to judge.

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Sen. William V. Roth Jr. (R-Del.) points to a line item on a CRT display during a demonstration of the Federal Assistance Programs Retrieval System at a Senate hearing last week. Looking on are Lois Park, New Castle County (Del.) councilwoman, and Paul Kugler of the Agriculture Department's Rural Development Service. Kugler developed the system.

New Technology Coming?

IBM Cuts 3330 Disk Prices 15%

By E. Drake Lundell Jr.
Of the CW Staff

WHITE PLAINS, N.Y. — IBM continued its clearance sale last week with an average 15% reduction on the purchase prices of its 3330 and 3333 disk systems.

The price cuts in the disk area quickly led industry observers to conclude IBM is trying to move these products out of inventory and off rent in order to prepare for the introduction of a significantly improved disk technology either later this year or early next year.

In the announcement, the price of the 3330-01 disk system was reduced from $47,610 to $40,470, the 3330-02 from $28,440 to $24,170 and the 3330-11 from $67,860 to $57,610. All were 15% reductions.

On the 3333 disk storage and control system, the price of the Model 01 was reduced 12% from $57,670 to $50,720 and the 3333-11's price cut 15% from $79,830 to $67,860.

The conversion price for upgrades from the 3330-01 to 3330-11 or from the 3333-01 to 3333-11 was reduced from $20,250 to $17,140. The string switch, feature 8150, was reduced from $7,345 to $7,200; there is still no charge for the remote switch attachment, feature 6148.

The move was clearly not dictated by technology since no new products were involved, industry observers said last week, but rather was an apparent attempt to bring the byte-per-dollar ratio closer to some other current products in the line.

In addition, the purchase-only nature of the reductions clearly indicated IBM wants to move these devices off rent and therefore out of the IBM inventory so it will not be stuck with a large inventory of outmoded products when it makes the expected, improved-technology disks available later this year, the observers said.

Based on the historical record, the case for an improved disk technology is persuasive, the observers said.

For example, the original 3330 announcement in 1970 offered a device that provided 3,800 bytes per dollar. In 1973, the double-density 3330 offered 5,300 bytes per dollar.

With the current price reduction on the 3330 and 3333, IBM is now offering users about 6,000 bytes per dollar.

Similarly, in "Winchester"-type technology, the 3340 in 1973 offered 3500 bytes per dollar, but this was improved in 1975 with the 3344 at 11,300 bytes per dollar, according to statistics compiled by International Data Corp. (IDC), a

(Continued on Page 5)

Proposed to Track Funds

Senators Try Out Grants System

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — A Senate subcommittee here last week participated in a demonstration of a computerized system designed to track the spending activity and cash flow of each domestic funding program the federal government offers.

Using Touch-Tone telephones and data terminals, the system's designers showed senators on the Committee of Governmental Affairs' Subcommittee on Intergovernmental Relations how they could determine just how much money was available for sample domestic assistance programs in one North Carolina county.

The system has been proposed to meet the financial information requirements of a bill, S.904, recently introduced in the Senate. That bill would establish a computerized system for dispensing information on federal domestic assistance programs to state and local governments [CW, March 21].

Developed by Paul R. Kugler and the Plans and Program Staff of the Rural Development Service at the Department of Agriculture, the system could initially be used as an enhancement to the Federal Assistance Program Retrieval System (FAPRS), also created by Kugler and currently the heart of the Senate bill.

But Kugler and his staff contend the system need not be used solely to track grant monies on-line. The system concept, which is similar to that used by banks to keep abreast of balances in checking accounts, could be employed to manage all government funds — particularly at the federal and state levels.

Even in its single application to FAPRS, the system holds the potential for increasing "openness in government," Kugler said. The smallest county will know exactly

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First User's Tests Show Itel AS/5 Equals IBM 155

By Frank Vaughan
Of the CW Staff

NEWPORT BEACH, Calif. — Pacific Mutual Life Insurance Co. here became the first user of Itel Corp.'s AS/5 mainframe after successfully completing preacceptance testing.

The system was purchased to replace a 3M-byte IBM 370/155 that the life insurance company had outgrown, according to Clark Hayes, second vice-president of information services.

"We are using it now and are just as demanding as we were in the testing. It has been over three weeks since the installation and we couldn't have asked for anything better," Hayes said.

The preacceptance tests were conducted by Itel and Pacific Mutual personnel at the Itel technical support center in Palo Alto, Calif. Pacific Mutual jobs and media were taken off the 155 and used in performing the tests, according to Hayes, who said no compatibility errors were found.

All tasks given to the IBM-compatible CPU were completed in equal or faster times than identical tasks processed on an IBM 370/158 with 3M bytes of memory at Palo Alto, he added.

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Agencies Told to Weed Out Unneeded Personal Data

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — Office of Management and Budget (OMB) Director Bert Lance has directed federal agencies to eliminate where possible data systems that contain personal information about individuals.

"We can reduce not only the cost of public reporting, but also the extent of unnecessary intrusion by the federal government into the private lives of Americans," Lance said in a memorandum asking agency heads to reevaluate these systems.

Lance's directive represented "no significant policy change" for the executive branch, according to Frank Reeder, a member of the information systems staff at OMB. The memo was intended "to reemphasize existing policy" and to follow through with the enforcement of a policy the OMB has "threatened" for some time, he said.

In a memo dated Feb. 16, President Jimmy Carter ordered Cabinet members and heads of other executive agencies to take steps to reduce the burden of government reporting on the public, Reeder noted.

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U.S. Case Drawing to a Close

Justice Ready to Depose IBM Witnesses

By Catherine Arnst
Of the CW Staff

NEW YORK — A good indication that the government's direct case in the two-year-old U.S. vs. IBM antitrust trial really is drawing to a close is that the parties are now arguing about the defense presentation.

In a conference held April 1 that even IBM Chairman of the Board Frank Cary was on hand to observe, Justice Department attorneys said they want to begin deposing about 300 of the 404 witnesses IBM is expected to call during its defense.

Lead IBM attorney Thomas D. Barr objected, saying such a process would delay the trial proceedings by one to two years.

When lead government attorney Raymond M. Carlson asked that IBM provide his trial team with a list of the witnesses it intends to call, the order in which they will appear and the documents it will use, Barr complained he has been urging Carlson for the same information for the last several weeks and has gotten no response.

"The government is holding up the show in this regard and has been holding it up for the last three years," he said.

Barr could not put forth any kind of a schedule because he and his staff are too busy, he said.

Judge David N. Edelstein, who had read IBM's latest annual report, found that claim hard to swallow. "You don't expect me to weep at your privations . . . If you need manpower, go out and get it. You can afford it," he told Barr.

The government wants a schedule from IBM so it can begin preparing for the defense case by taking depositions, or examine upcoming witnesses, to determine the extent of their knowledge. Those to be deposed would include any IBM witnesses who have refused to be interviewed by the Federal Bureau of Investigation agents, whom the Justice Department is using to interview witnesses; those whose interviews or depositions are incomplete; and those named by IBM after presentation of its June 3, 1974 witness list.

It would also include those who have information on events that occurred since their original depositions or interviews.

New Justice Team

Barr implied that what the government really wants to do is reopen the entire discovery procedure for the benefit of the new trial team the Justice Department is bringing into this case.

Carlson, who has supervised the entire trial team, will be leaving his post at the end of the government's direct case. He will be replaced by Robert Staal, who was officially introduced to the court for the first time Thursday.

The government's trial team on this case has been plagued by staff changes because "it is an unusual case that wears people out," Carlson said. Lewis Bernstein, the Justice Department section chief who oversaw the case, retired earlier this year and James Serota, who has been with the case since the beginning, has indicated he may be leaving soon.

The government has a new trial team that is "eager, anxious and wants to get crackin'," Barr said, but their efforts to familiarize themselves with the case will delay the procedures interminably.

Carlson suggested his side only wants to take further depositions to serve "judicial efficiency" and estimated perhaps only 200 witnesses will need to be deposed. IBM has already deleted 74 names from its witness list.

IBM Not Suing ISS Over 3330

Computerworld has learned Information Storage Systems (ISS) employees were never sued by IBM for stealing information on the IBM 3330 disk drive, as was stated in an article in the March 4 issue.

In the story entitled "Dismissal of Calcomp vs. IBM: Act of Courage? Case of Rape?", Maxwell Blecher, attorney for California Computer Products, Inc., was quoted as having said ISS was the first of many companies to be sued by IBM for the theft of 3330 documents.

Blecher recently clarified that comment by claiming that IBM "looked the other way" when ISS was formed by 12 IBM employees with 3330 disk drive information.

The testimony of Richard Whitcomb, introduced at Calcomp vs. IBM by the defense, provided evidence that IBM knew ISS had the plans for the disk drive but let the whole matter slide, Blecher said.

The Calcomp attorney maintained IBM only sues a firm for trade secret theft when that company brings antitrust charges against IBM. ISS, which was later acquired by Univac, has never done that, he added.

Both ISS and IBM confirmed no trade secret suit over the 3330 disk drive ever existed between them.

"At no time in the past has the company's management been aware of any allegations from IBM to the effect that documents relating to the IBM 3330 disk drive or any other IBM product were stolen by any employees of ISS," a Univac spokesman for ISS said.

Correction

Digital Equipment Corp. incorrectly stated the prices for the PDP-11/60 introduced recently [CW, March 21], a company spokesman said.

The PDP-11X/60 with 64K bytes of core memory and the CPU for OEMs costs $31,700; it costs $25,700 with 64K bytes of MOS memory and the CPU.

The 11T/60, which includes an RK05F fixed disk and an RKO5J removable disk for a total of 7.5M bytes and 64K bytes of memory, costs $44,700 for the MOS version and $50,700 for the core version.

The PDP-11S/60, which includes a basic 128K bytes of memory, two RK06 disks for a total of 28M bytes and the LA36 hard-copy terminal, costs $62,700 for MOS memory and $67,300 for core.

Add-on MOS memory costs $5,000 for each 64K-byte increment and add-on core costs $8,100 for the first increment and $6,600 thereafter.

A basic PDP-11/60 with 256K bytes of MOS memory, 28M bytes of disk and a hard-copy terminal therefore costs $72,700, according to DEC.

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SORT LIB

"Why the devil don't you put out a SyncSort for DOS users?"

"We just have."

(As of May 1, all SyncSort users are created equal!)

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Line up a DOS sorting adventure!

We are pleased to announce — with a great deal of psychic relief — that the new DOS version of SyncSort will make its appearance on May Day.

Over the past couple of years we've been busier than a dog with fleas as we brought forth a number of SyncSorts for OS and OS/VS users.

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First AS/5 User Finds Itel Machine Equals IBM 155

(Continued from Page 1)

"We were using our own operating system, along with our own disk packs and tapes," he explained. "All tests were run on both machines.

"In terms of verifying compatibility, all results were computed by the 158 to compare with the results from the 155," he noted.

"The time improvements ranged from insignificant to about 5%. There was more improvement in the CPU-bound jobs and less in the ones where I/O was involved.

"That wasn't anything we were counting on. We were expecting them to be equivalent, and it was a little bonus, really, to find out the AS/5 was a little faster."

"We were quite elated to see everything finished to absolute perfection. When we entered the testing phase, we were determined to accept nothing less in all test stages. However, we didn't really expect all tests could be completed without at least one rerun or correction," according to Kenneth Garrison, Pacific Mutual's vice-president of systems and DP.

"We ran [the AS/5] full bore for 40 hours without a hardware failure," he said.

"Had it run for 39 hours and 59 minutes and had a hardware problem, we would have called the test a failure and started over," he added.

In that test, a jobstream was run with five initiators for a duration of 2.5 hours. The jobstream consisted of five long assemblies, five Cobol compilations, two CPU-bound jobs, three tape I/O copies and three disk I/O copies. The jobstream was rerun until a total of 40 consecutive hours had elapsed.

In other testing, four error recovery tests were given to the mainframe, including a memory error recovery test, two channel error recovery tests and an in-board machine check error recovery test.

Pacific Mutual ran a three-phase test to certify the system speeds, compatibility and reliability.

In the first phase of the testing, a single job tested the speed of instructions, the CPU, the high-speed buffer and the memory; it contained an I/O loop.

In the second phase, a jobstream of six jobs consisting of compilations and link-edits was run. The run lasted approximately 30 minutes and all of the compilations and edits were performed successfully, the user said.

The third phase of the testing was the 40-hour test.

The system is supporting a variety of peripherals including IBM printers and I/O devices. It also supports California Computer Products, Inc. 3330-type disk drives, Storage Technology Corp. 3420-type tape drives and Computer Optics, Inc. communications terminals.

Senators Try Out Grants System

(Continued from Page 1)

how much money remains to be applied for in a given domestic assistance program.

Under the Senate bill, FAPRS would be run by the Office of Management and Budget (OMB); the system already tells inquiring communities what programs are available to them and pinpoints the ones for which they are eligible, he explained.

The financial tracking system would provide such additional information as what funds have been allocated to a given program from congressional appropriations; what applications for funds under that program have been accepted by the federal government; what monies the government has obligated to those applications; and what checks federal agencies have actually written out to these county and state governments, Kugler said.

Accountable Inputters

Data would be put into the system by the program official responsible for each of these transactions — allocations, applications, obligations and outlays. By making these officials "absolutely accountable" for the information they input, Kugler hopes to provide OMB with the tools to manage these funds as well as track financial information contained in the grants data base.

The data will be as current as the day the reports are made by program officials, he explained. Monies will actually be tracked by program and project numbers.

Program officials will be able to verify the information they input because the system will play it back to them, no matter what input device they use, Kugler noted.

Like FAPRS, the financial tracking system will depend on the use of commercial time-sharing systems to store and maintain the data base, Kugler stated.

Even the most remote location in the country with no computer terminal and a very low volume of grant and loan transactions would be able to access these timesharing networks using a Touch-Tone phone or a rotary phone with a Touch-Tone pad, he said.

Locations with a high grant-transaction volume but lacking computer terminals could use a Touch-Tone phone and a Vuset data terminal for $25 to $30 a month, he said. A small CRT terminal manufactured by Plantronics, Inc., the Vuset employs the telephone keyboard for data input. It can be obtained by county and state government offices from local telephone companies.

The Bell operating companies will service the terminal and provide training for the program officials who would use it, Kugler added. A central data station, also maintained by the phone company, would provide the necessary interface between the terminal and the time-sharing companies.

Three or four years from now, the system would cost approximately $4 million each year, Kugler estimated. He stressed that the proposal he is presenting to the Senate Government Operations Committee will involve "no additional government investment" in computers or equipment.

Datapro's Latest Seminars!

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1 MINICOMPUTERS AND MICROCOMPUTERS: SELECTION AND USAGE GUIDELINES
A survey and analysis of currently available minicomputers and microcomputers and their applicability and capabilities in the rapidly changing systems and use modes. This course will present a description, categorization and analysis of the current equipment (hardware) facilities, software facilities, and system integration capabilities of existing and evolving minicomputers, super-minis, and microprocessor-based intelligent terminals and systems. Included in the course are evaluation guidelines and competitive comparisons of existing vendors' product lines and business methods, as well as discussions of the relative value of vendor features/functions and system integration capabilities. The presentation will include comparisons and evaluations of hardware and software, including terminal/workstation access facilities, operating system types and facilities, file/database facilities, communications and terminal control facilities, and vendor modularity and support considerations. The fast changing offerings and capabilities of microcomputer-based "intelligent terminals" will also be presented and related to the evolving requirements of today's networked or distributed systems.

This seminar is intended for all persons with systems or administrative responsibility for planning and designing current and future business information systems, regardless of their scale. For systems designers, product planners, EDP managers, technical staff and other dp professionals—anyone responsible for evaluating, specifying, buying or using minicomputers and microcomputers.

2 EFFECTIVE COMPUTER OPERATIONS MANAGEMENT Acknowledging the increasing magnitude of each organization's investment in EDP and the intricate role data processing plays in supporting and controlling day-to-day operation (such that in some cases operation virtually comes to a standstill when the EDP system is unavailable), management has become more and more concerned about insuring the quality and the effectiveness of work management procedures and controls implemented in the computer operation area. The purpose of this seminar is to discuss the controls, techniques, and procedures of effective computer operations management, offering down-to-earth discussion on implementation, problems, successes and failures, all with the objective of having the participant carry away some ideas, practices, techniques, etc., which will permit more effective management of their installation.

This seminar is designed for managers, supervisors and key personnel working in the computer center. In addition, individuals from user area: remote stations, senior programmers and senior analysts—all who work closely with the computer center should find this session quite informative.

3 WORD PROCESSING: GUIDELINES FOR PLANNING, DESIGN, AND IMPLEMENTATION
This comprehensive seminar approaches the word processing area from two perspectives: an overview of concepts, systems and products, and an application of this more general information to very specific office functions. Beginning with a basic treatment of word handling tasks and their related personnel, it will show how word processing function can be evaluated and how decisions can be made about the cost/effective selection of suitable, systems-oriented equipment. Question-and-answer periods will address special user problems and review pertinent case studies. Every area of discussion will be related to the attendee's specific goals and objectives. Guidelines and standards for measuring effectiveness of equipment and personnel will also be established. The seminar concludes with a discussion of the automated office, or the "office of the future," and describes the role of word processing in these future systems. An extensive and detailed lecture outline with ample room for note taking is part of the seminar. Additional background materials and copies of all visual aids are included for subsequent reference.

This seminar is designed to provide maximum benefit to word processing supervisors and managers, and administrative and office management personnel who are involved with office systems planning or with costing and buying word processing equipment. The seminar will also be invaluable for systems and data processing management personnel who are responsible for integrating the word processing function into broad, company-wide information systems.

4 PRIVACY, SECURITY AND INTEGRITY OF THE DATA BASE A data base is only useful if the information it contains is both valid and consistent. This seminar directly considers data integrity as it specifically relates to the privacy, security, and recoverability of data in a data base. The seminar is intended to familiarize participants with the principles and essential elements of integrity, security, and recovery, and emphasizes the development of both administrative and automated procedures designed to meet the specific requirements of a data base environment. At the conclusion of the seminar, attendees will be capable of planning for data base integrity in their installation, and defining the specific roles and responsibilities of data base administration and other individuals with regard to privacy, security and recovery.

This seminar is for data base administrators, data base systems designers and senior programmers affected by the issues of privacy, security and recovery. A basic knowledge of data base concepts is required.

5 DATA COMMUNICATIONS: ADVANCED CONCEPTS AND SYSTEMS Significant changes are occurring in the data communications field. All too often, however, day-to-day duties prevent system designers or managers from keeping fully abreast of some of these developments. This seminar is designed to fill that critical void. The program provides a comprehensive and intensive overview briefing on what's happening in data communications. Each subject area is addressed as to its essential aspects, with an emphasis on application significance. Technical aspects are generally limited to those necessary for familiarization, or to enable discussion of functional significance. And to minimize the drain on the busy manager/designer's time, we've wrapped it up in a fast-paced two-day program. In a situation where almost each topic could be a full seminar, this is not a how-to-do-it program. It is, however, an important first-level review of key factors, application relevance or significance, cost-performance aspects, and thorough introduction to the concepts and pertinent issues in each case.

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2 **Effective Computer Operations Management**	June 8-10	May 23-25	June 13-15	June 22-24	May 18-20
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FCC Tariffs Tymnet as Second Public Packet Carrier

By Ronald A. Frank
Of the CW Staff

CUPERTINO, Calif. — Tymnet, Inc. has become the second public packet carrier to serve U.S. users after approval of its first tariff by the Federal Communications Commission (FCC).

Tymnet began operations in 1971 and had been providing service under joint use and sharing arrangements until it was authorized to operate as a carrier last December. Telenet Communications Corp. was the first packet network carrier to gain FCC approval.

About 50 users of the Tymnet packet network will be affected by the change to a tariffed service; most will receive a 10% to 20% rate reduction depending on the volume of data transmitted, according to a Tymnet spokesman.

The reductions will be made possible by discounts based on volume included in the tariff.

The carrier also received FCC approval to increase its network from 63 to 111 metropolitan areas. The network now includes 26 high-density, 47 low-density and 38 foreign exchange areas.

The public packet net includes 70 intelligent nodes served by a network processor. Unlike other networks, only three Tymnet nodes are nonintelligent and operated with multiplexers, the spokesman noted.

Most processors in the network are supplied by Varian Data Systems and include 620s, V72s and V73s. More recent nodes have Interdata 7/32 processors.

At present, the network does not provide an X.25 interface, but discussions are being held with the Trans-Canada Telephone System (TCTS) to offer a link to the Canadian Datapac net, the spokesman said.

Tymnet service is provided for a single user or up to 256 users from the same organization with monthly charges for host processor interfaces ranging from $100 for a single user to $2,750. As many as four host processors for one organization can be accommodated by a single interface, Tymnet said.

Measured usage charges for 110- through 1,200 bit/sec service are composed of connect time, ranging from $1 to $5 per hour depending on location and numbers of hours monthly, and character volume transmitted monthly. Cost per 1,000 characters transmitted ranges from 3 cents to 10 cents, depending on volume and transmission speed.

Users can elect dedicated host ports, rather than measured access and characters, at a cost ranging from $300 to $650 monthly depending on the number of ports used, the spokesman added.

An expanded message-switching service with store-and-forward capability will be introduced soon.

Tymnet is at 10261 Bubb Road, Cupertino, Calif. 95014.

IBM Reduces Prices Of 3330 Disk by 15%

(Continued from Page 1)

market research firm.

With this historical perspective in mind, IDC researchers indicated, IBM can be expected to announce a disk system with a ratio of approximately 20,000 to 25,000 bytes per dollar either late this year or early next year since in the past the number of bytes per dollar has been doubling about every two to three years.

Another reason for the move in the disk area at this time is the possibility that IBM is no longer worried about antitrust constraints, other industry observers said last week.

Since California Computer Products, Inc.'s antitrust case was dismissed, IBM apparently has few worries about charges of anticompetitive action in this area, one indicated.

At the same time, the independents have been making significant inroads into the IBM market share in the 3330 disk area, the sources said. It was estimated independent drives now account for about 35% of the installations of 3330-type devices.

OMB Orders Agencies To Weed Out Systems

(Continued from Page 1)

The President asked agency heads to establish goals for the reduction of reports and to suggest changes to legislation which may now require unnecessary public reporting. Agencies are required to submit their plans to OMB by Sept. 30.

Lance noted federal agencies now maintain more than 6,700 personal data systems containing almost 3.9 billion records — more than 80% of which are based on information obtained from the public. These records range from Social Security and tax files to law enforcement data.

Three Directions

The OMB is pushing the agencies in several directions at once, Reeder said. First, agencies are being asked to physically reduce the amount of information the public must provide.

Second, agency heads are being faced with the task of looking at their reporting systems and trying to reduce copies of records in the data banks and reports generated as a result of them, Reeder said.

Not only must an agency determine if a given system is necessary to its operations, its officials must try to reduce the number of records on individuals by reducing the size of the population the system covers, he added.

Finally, OMB would like to see the agencies reduce the number of public notices on each personal data system they maintain. The executive agency hopes that by reducing the volume of material published on these systems, agencies will be able to clarify the information the public receives, Reeder explained.

OMB expects to have some results on this program by the end of the year and anticipates the decrease in federal data systems on individuals will be reflected in the third annual report to Congress required by the Privacy Act of 1974, Reeder stated.

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Ethics Scenarios Bring Similar Responses

(Continued from Page 1)

Most of the readers railed against those who knowingly participated in the scheme, while others judged ethical the behavior of those who made reports to the manager.

It is probably fair to assume most of the "ethical" responses applied to the programmers who reported the unusual activities rather than the ones who participated in the fraud.

Seventy-one percent, or 238, of the respondents said the programmers were unethical, whereas 20%, or 67, felt they were ethical and 4%, or 15, indicated there was no ethical issue.

Scenario A

Scenario A involved a programmer who felt a state department of health's rules governing confidentiality of data were inadequately enforced. After discussing his feelings with management, with no success, he accessed his own health records and presented them to a state legislator to expose what he thought was wrong.

There were no state laws controlling confidentiality of medical data. The programmer was ultimately fired.

The following comments on this scenario were selected at random from the responses received.

He was correct in violating rules to show the need for more control. Send me his resume!

A person should stick to his convictions if he really believes he is doing the right thing, regardless of the consequences.

Ethics do not come cheaply.

A pubic employee's first loyalty is to the public.

He could have made impact without violating rules of confidentiality, i.e., worked within the system to expose problem to legislator.

Ethics must be actively pursued, not passively wanted.

Programmer should resign first, then pursue truth.

Though the system was inadequate, it was legal. Going to a legislator in this case was unethical.

The programmer was taking the only remedial action left.

The programmer broke the system security to show lack of control and to effect a change his management was not responsive to. He did not reveal data other than his own.

In too many cases, the only way we know a government is unethical is when employees report it to reporters, etc., i.e., Pentagon Papers.

Programmer should not have been fired. Higher management should have initiated request for access controls.

Ethics don't always have a place in the jungle or the business world.

This is the Eichmann principle; the programmer has a moral obligation to behave as he has.

He should have been more discreet in methods of exposing. Should have recognized stupid management would attack him rather than problem.

He hurt no one except his incompetent superiors, who deserved it. (I work for some of the same kind of people at the IRS data center.)

Scenario B: Manager

This scenario involved a DP department in a large corporation. The manager was told to do only what he was asked to do without question.

Two programmers were "knowing participants" in fraud being perpetrated by top executives by writing programs, ostensibly for use in testing, which served to alter master files.

Although the manager was unaware of these programmers' involvement, several programmers reported to him that unexplained, unusual activities were going on in several parts of the company.

When the fraud was uncovered, the perpetrators were prosecuted; the manager was named an unindicted coconspirator

In this scenario, we asked DPers to judge the actions of both the manager and the programmers. Following is a sampling of the responses on the manager's actions.

Rather stupid — but obeying orders and not directly involved. Should have investigated and, if he found fraud, should have resigned and reported to auditor.

More of a management problem than ethical or not.

Failure to investigate because of fear is not a matter of ethics.

Manager didn't know, so never had to make an ethical decision.

Should have been more aware. Should have blown whistle when brought to his attention.

Typical "ostrich" attitude of manager eventually spelled his demise. Unethical in strict sense, but so very common.

Incompetent.

Manager was stupid and, perhaps, unethical. His duty is to know what goes on in his department and shop, especially after having the matter brought to his attention.

He should have been indicted with the rest.

Knowledge of financial problems required no assumption on his part that they were caused by programs or any DP functions.

Manager should have gone to CPAs or local law enforcement officials to report the unauthorized activity.

Here is a case in which an individual is held responsible for the wrongdoing of others. The key in judging is in whether he was unaware of wrongdoing or chose not to see it. If he was unaware of wrongdoing, then his action was appropriate.

No guts to pursue apparent wrongdoings. Stockholders' welfare is his responsibility, too!

To remain unaware in order to protect himself is unethical conduct.

Professionalism requires accountability; the manager was unable to accept the responsibility for his actions and therefore behaved unethically.

The manager could have known. However, if as a manager I had to know what every step in every program consisted of, I would not be able to perform all of my duties. Several steps of a program could pass me by, as I believe happened here.

Perhaps he could have done more, but how could he have known of the fraud?

Failure to take action (resign and disclose fraud) is tacit approval.

He was a "good soldier" and followed orders.

A fool. Anyone who turns his head is as much at fault as those who do the dirty work.

Scenario B: Programmers

The readers were much harsher on the programmers involved in the scenario, as the following sampling of responses indicates.

Should have quit. As guilty of conspiracy to defraud as embezzlement from cash receipts.

Guilty of fraud.

The programmers acted illegally. They should not knowingly use their skills to commit illegal acts.

Assume the programmers were ethical, but could only see parts of the whole and never the whole.

These people bastardize the DP profession. They should have made their actions known at the onset.

The programmer who reported "unusual activities" did the right thing.

Programmers who helped with fraud unethical. Programmers who reported unusual activity ethical.

They should be nailed (or hung) to the yardarm.

Those knowingly participating deserve maximum penalties.

A thief's helper is no less a thief than his master.

Participant programmers should be jailed along with the executives.

Stealing without a gun.

Dishonest, unethical and stupid. At least professinal pride should have prompted some more ingenuity.

The programmers knew they were falsifying records to deceive shareholders and others. Even if acting under orders, they were still acting wrong under the ethics of our society.

Guilty as charged. Fraud is the highest and most embarrassing [crime] for all DPers.

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'Turnkey' Systems Nonexistent in Practice, Users Told

By Toni Wiseman
Of the CW Staff

LOS ANGELES — There is no such thing as a turnkey package or system, Los Angeles Computer Caravan attendees were told here last week.

George Tamas, president of Tamas and Associates, illustrated this opinion by pointing out a case study of 15 cities in California which entered into a joint powers agreement for a large IBM system in order to save money.

The cities believed that since they were basically similar business entities, they could share software packages. But, as they started getting into individual applications, they found they didn't all do things the same way and one payroll package, for instance, could not serve all 15 cities.

"The net result from a technical standpoint was that they had a crazy quilt of tacked-on programs that would somehow satisfy each city but not give it exactly what it wanted," Tamas said.

Since turnkey systems do not really exist, according to the speaker, he gave the audience a list of procedures for ensuring successful system implementation.

The user's first step should be to gather information. When he decides to automate a manual system or feels he could do better for the money he is spending, he should prepare an extended company profile, Tamas said.

The profile should detail company activities, goals, services, products and past and projected growth.

All applications which will come under the DP area should be listed along with the associated reports, forms and volumes data, he added.

Second Stage

The preliminary specification stage follows next, involving taking a close look at hardware, operating software and application software.

In terms of system software, the most important considerations are the operating software, file management or data base software and the compilers, Tamas said.

These specifications lead to the evaluation and selection stage. At this point the user should not only evaluate the vendors' answers to the request for proposal, but should contact and optimally visit a user's site for one to three days to see how the actual processing takes place.

"Don't settle for a demo," he advised. "It will only show you what the manufacturer wants you to see.

"Watch the ease or difficulty the end user has at his site. Ask him what you should look out for," he said, emphasizing the importance of a thorough investigation of other end users.

"Find out the reputability and expertise of the team which is going to install your system, not just the manufacturer's expertise, because the installer is typically not the manufacturer.

"Based on that scrutiny, you're buying a known quantity. It's not enough to know that company XYZ has installed four dozen systems. You need to know the quality of the employees, since the guy assigned to your installation may have been hired last week.

"This is the single greatest guarantee of success," he said.

Contract negotiations are another important stage. The user spells out exactly what the manufacturer is going to do for him in terms of software, reports and multiprocessing.

"This way, if the vendor has underconfigured your disk, you have something to turn to four months down the line when you find it out," Tamas said.

The fifth stage deals with system redesign and development, but not installation. The user prioritizes his applications.

"Never attempt to install all the applications simultaneously," Tamas warned. "That guarantees disaster.

"You have to have a definite priority schedule for installation because the sheer volume of effort is an unbearable burden for the organization."

This exercise is followed by the preliminary test phase, be it a parallel run or data testing. Tamas suggested the user throw as much "screwball information" into the test data as he can, along with the reasonable legitimate data.

"This is the reevaluation phase which shows you what the system will really look like. If it doesn't operate as advertised, this is where your strength in contract negotiations and software specifications will pay off," he said.

Tamas also suggested a two-cycle test to ensure that projects and reports which depend on accumulated data are being processed correctly.

During this same stage training should be conducted for data entry personnel and for management, he added.

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Privacy Act Called 'Sunshine Law'

Communications Seen Upsetting Federal Power Balance

By John P. Hebert
Of the CW Staff

ATLANTA — The balance of power in government could be upset by federal agencies' increasing use of data communications technologies, according to a staff member of the Privacy Protection Study Commission.

Data communications tends to affect the scale of activity in government and business, typically escalating the transmission of information, Christopher E. Heller, a senior research associate on the commission, said at a conference here recently.

Although there is federal control of its communications systems, the system itself has the power to determine whether the information provider or recipient will be more powerful, depending on how each uses the data, Heller said.

"We must ask the question, 'What are we doing with information?' rather than 'How are we doing it?' " Heller said, indicating data communications has become a "given" in government.

And the traditional question of "whether we want to adequately safeguard the privacy of individuals" is irrelevant, he said. The question now has become, "How?"

Retrofitted Privacy

The fact that there is a commission to study implementation of the Privacy Act of 1974 reflects the fact that a close look has not been taken at what the government hoped to accomplish with the law, according to Heller.

Communications users will be retrofitting government policies on privacy and security for information systems for many years to come, he told attendees.

There are many privacy and security issues that have come to the attention of the Privacy Protection Study Commission, and many of these questions have not been adequately supported by the 1974 legislation, he said.

Safeguard issues which still need to be resolved involve adequate addressing of the problem of intrusion, fairness and confidentiality, he indicated.

The privacy commission has made three recommendations for policy objectives to combat inadequacies in the present law, he noted.

The recommendations put forth suggest that individuals should get something in return from the organization receiving or providing information about them; that records management should be employed to maximize fairness; and that certain relationships that are legally enforceable should meet the expectation of confidentiality, Heller said.

At that same session, the Privacy Act of 1974 was called a "piece of sunshine legislation" that gave government agencies too much discretion in determining how it would be implemented.

A spokesman for the Office of Management and Budget (OMB) said government agencies' technical managers were left with the responsibility of establishing the security criteria to deal with the risk of disclosing sensitive information.

The OMB's Franklin Reeder explained that although the cost of implementing the Privacy Act was found to be less than originally estimated, the law has proven to be expensive.

The projected startup costs to implement the act were expected to reach the $100 million mark while between $200 million and $300 million were projected to keep recordkeeping systems running each year, he told conference attendees.

In a survey of all federal agencies last summer, OMB found the actual startup costs associated with the law were $70 million lower than the original estimate, while the operating costs were found to be drastically lower, he said.

The figures obtained from the study, however, may not be accurate, Reeder conceded, because the 90 agencies surveyed were burdened with work and made educated guesses.

'Reverse Bias' Effect

Moreover, there may have been substantial effects from a "reverse bias" on the part of agencies which didn't want to show their inefficiencies, he said.

This bias, he added, could alter the results downward by as much as 50%. In addition, there could be results from a few "secret systems" which may not have been reported to the OMB, Reeder admitted.

More than half of the operating costs to keep the systems in compliance with the regulations set forth in 1974 were devoted to personnel ($20 million), while $3.7 million was spent by the agencies for publications because the legislation created a substantial paperwork load, Reeder said.

A solution to ensure the privacy of individuals has not yet been found, according to Reeder. The logical technical solution is to set up a central index file to let people know if there are government files on them, he said.

This approach would eliminate many of the costs incurred through duplication efforts, he indicated.

Cospeaker Heller agreed that a technological solution can be found to provide people with a decoded copy of the computerized files kept on them by government or business organizations.

Credit bureaus, for example, are very protective of the information they maintain on individuals and better technology would make it easier for people to find out what information is being kept on them inexpensively, he said.

And better transmission facilities may be a solution to the recordkeeping problem, he said.

When pressed by an attendee to describe the particular technology, Heller said the Privacy Act doesn't deal with technology per se, but rather with a system, a body of records.

A new idea that has come out of the commission's recent study about the 1974 legislation is that an omnibus approach to the problem has been rejected, Heller said.

Reeder agreed that the act may have reached its limits and revisions to the law "may go after a more sectored approach."

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Should Congress Let the IRS

Yes: System Would Protect Privacy, Improve Service

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — The Internal Revenue Service (IRS) must upgrade its DP system to a distributed Tax Administration System (TAS) if the agency is to continue to meet the demands of tax accounting and taxpayer service, according to Patrick J. Ruttle, assistant commissioner for IRS data services.

TAS has received public criticism in recent weeks following the release of a report by the Office of Technology Assessment (OTA) suggesting it could violate individuals' constitutional rights [CW, Feb. 21].

Although the publicity the project has received might lead one to believe this is the first time IRS has attempted to automate its tax files, this could not be further from the truth.

The agency first moved to computers in 1960-61 when it planned a conversion from an electronic accounting machine system to third-generation computers.

The issue of centralized vs. decentralized processing was faced at the time, Ruttle said, but because the single master file then represented the state of the art, the IRS decided its system must have a center.

Martinsburg, W. Va., became that center with the master file on tape serving 10 IRS service centers through weekly batch processing, Ruttle stated.

Today, as in the early 1960s, these 10 centers throughout the country send all their transactions to Martinsburg, where the files are updated. Reports are sent out to the service centers from the master file in West Virginia; three weeks is the least amount of time required to give a taxpayer a response from the system, the assistant commissioner for data services said.

Over the years, IRS has added direct data entry capability to its system in hopes of improving taxpayer service, he added. Taxpayers have benefited from a touch of real-time processing in the 10 service centers, too, he noted.

Redundant Files

In recent years, the IRS has established an Integrated Data Retrieval System (IDRS) in which the agency brings 8% to 10% of the master file in Martinsburg to each of the service centers.

But the IDRS represents a redundant file system. Presently, it relies on three different vendors: IBM for the master file, Honeywell for data validation and entry and Control Data Corp. for the real-time system itself.

Every time Congress changes the tax laws, the IRS is faced with the monumental effort of patching the component parts of the system together again, Ruttle said. While good for its time, the system design is antiquated and the hardware is aging.

Viewed as an update to the current IRS processing system, TAS and the plans for it were started as early as 1969. The Mitre Corp. determined new technology, chiefly mass storage, now would permit breaking up the master file among the service centers, Ruttle said.

Between 60 billion and 70 billion characters of information could be stored at each center under the TAS design for distributed processing, he added.

The present national computer center at Martinsburg would become a communications center providing a national account directory — a switching center for accounts moving between centers and the national reports required, he said.

Stressing that TAS represents no more than a conversion from batch to on-line, real-time processing, Ruttle said there will be no real change in the tax files themselves. The basic account structure will be maintained, thus easing privacy considerations, he stated.

Major Part of Design

IRS considers the issue of privacy and security to be a concern running parallel to taxpayer service, according to Ruttle, and safeguarding taxpayer information has been a major part of the TAS design.

Under the updated processing system, the IRS would continue many of its present policies designed to ensure the integrity of its employees. Preemployment screening, heavy on-the-job training and supervisory reviews at all levels of management would be key administrative tools employed in the interest of protecting information under TAS, Ruttle said.

Limits on Terminal Use

Certainly a key element in safeguarding taxpayer privacy is a limitation on the use of the 8,300 terminals that will be part of TAS. About 5,400 terminals will be located in the 10 service centers and used only for processing returns, Ruttle said.

Another 2,900 terminals will be placed in district and field offices to handle taxpayer service audit and collection operations. Approximately 2,000 additional terminals will be used for on-line error correction, a feature new to the IRS processing system, he stated.

Safeguards for terminal use would include an extensive system of terminal profiles restricting the use of individual devices as far as possible, Ruttle said. Each employee, too, would have a profile permitting him to perform only those terminal tasks related to his job.

Dangerous combinations of duties would be avoided, and many IRS employees may only be able to research or look at an account, he added.

Terminals will be activated by employee identification badges, each bearing a magnetic stripe, by passwords and by a series of access codes.

TAS will also have appropriate limitations on the use of terminals for batch processing. Physical security precautions such as production schedules and separate tape libraries will be used to prevent unauthorized entry to the computer room, Ruttle stated.

Again, there will be internal validity checks to permit terminal use. The IRS will employ audit trails with TAS as it does with its present real-time and batch processing

(Continued on Page 11)

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Go Ahead With Plans for TAS?

No: System Could Abuse Every U.S. Taxpayer's Data

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — The case against the distributed computer system the Internal Revenue Service (IRS) has proposed to replace its 20-year-old centralized tax system has gained strength here recently.

Two more congressmen as well as Dr. Ruth M. Davis, director of the National Bureau of Standards' (NBS) Institute for Computer Sciences and Technology, have entered the fray, calling for more specifics on how taxpayer privacy would be assured.

In a joint letter, representatives John E. Moss (D-Calif.) and Charles Rose (D-N.C.) have asked the House and Senate Appropriations Committees to refuse approval of the system in principle and refuse funding for procurement even in a minimal matter until the IRS has satisfied congressional misgivings about the potential abuses of taxpayer information contained in the proposed Tax Administration System (TAS).

Citing the Office of Technology Assessment (OTA) report on TAS released a little more than a month ago, Moss and Rose said they, too, want the IRS to provide more substantive information to the public showing how the distributed system will avoid its potential for surveillance, harassment or political manipulation of tax files [CW, Feb. 21].

The congressmen also requested the U.S. Comptroller General conduct a further study of TAS through the General Accounting Office (GAO).

At the same time, the NBS' Davis wrote to Marcia McNaughton, OTA project director for the TAS study, praising the report for properly alerting Congress and the public to the danger of leaving the issue of acceptable levels of risk in a system like TAS unanswered.

Davis added the OTA report on TAS should not be the normal end of dialog between Congress and the executive agencies in determining and assessing government accountability in matters of deep concern to the public and individuals at large.

Unnerving Projections

Moss and Rose are particularly wary of two projections made in the OTA report. The first of these is that some kind of hookup would be developed between TAS and banks around the nation to check on daily balances of businesses and individuals.

Second, the congressmen cited OTA's comment that by fiscal year 1979 the Social Security Administration (SSA) and the IRS will be required by law to share incoming tax data on all W-2 forms.

This will probably require a direct link between the computers of the two federal agencies containing perhaps more data on individuals than any other federal agencies, Moss and Rose wrote.

Most professional observers feel that it would be a physical impossibility to fulfill such a mandate through manual tape exchange and that electronic transfer would be the only viable alternative.

Moss and Rose questioned how such a legal mandate could be carried out without violating the Privacy Act of 1974. They also wondered whether the SSA and the IRS could carry out such a task without abusing the data of millions of citizens.

The congressmen specifically asked the GAO to look into this matter and to explain how the proposed TAS relates to the work done by OTA and the National Commission on Electornic Fund Transfers.

Calling the OTA's report precedent-setting, Davis said she is aware of no other report which has addressed a conglomerate of issues of such societal, public and governmental import associated with a highly complex automated information system as did the OTA's report on TAS.

The typical review or audit deals with tangibles like physical security, file size and the costs of operations, Davis stated.

"What we fail to recognize is that we have little skill or experience in even asking the appropriate questions to enable an adequate technology assessment" of a computerized recordkeeping network that would handle information of such national significance, she said.

Even more importantly, TAS would be handling information of significance to almost every adult U.S. citizen, Davis added. As a member of the OTA panel reviewing TAS, the NBS director said she was disappointed OTA's resources only permitted holding one meeting.

"It is not surprising that we were unable to ask but a few of the right questions. Certainly the IRS should not be chastized for not providing all hoped-for resources under such circumstances," Davis stated.

The questions remaining to be answered with regard to TAS and systems like it revolve around the concept of risk. In Davis' view, policymakers need to ask themselves what level of risk the American public can tolerate with this system, what kinds of risk they are introducing with the system and how the risks match the gains.

When those who must accept the risks are not those who obtain the benefits, then the problems of accountability are certainly exacerbated, Davis wrote.

System Could Boost Taxpayer Services

(Continued from Page 10)

systems.

Daily reports will be furnished to regional and district administrators on possible unauthorized access to the system, Ruttle said.

As is now the case, the updated system will lock out any IRS employee who tries to access his own tax file. TAS will also provide a computerized inventory of all chargeouts of tax returns for research and study, he added.

Data communications safeguards will abound in TAS, Ruttle said.

At the recommendation of the Office of Management and Budget, the IRS expects to encrypt each of the lines between the service centers and Martinsburg, he said.

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In Going From GE 400 to IBM 370

Firm Designs System Change With End Users in Mind

By Toni Wiseman
Of the CW Staff

SAN FRANCISCO — Why would a company change from a Honeywell 400 CPU with a network of 115 processors to an IBM 370/158 with Data 100 Keybatch systems and not choose to go to IMS transaction processing?

Because the user in the field is happy with his current modus operandi and doesn't want to be traumatized by both new hardware and a new system, according to Sid Smith, consulting data communications analyst with Crown Zellerbach Corp.

"The user in the field doesn't want everything changed at once, so we're changing the hardware first to eliminate the possibility of a huge nightmare for our users," he told Computer Caravan attendees here recently.

Smith and Don Gamma, Zellerbach's administrative manager of management information systems, discussed the selection process they went through before installing their current network of remote batch systems. The DP operation is presently phasing over from the 400 CPU to the IBM system, application by application, location by location. Full changeover is not expected before the end of 1978, Smith said.

The first system consisted of dual 400s, supplied by General Electric before its Honeywell merger, front-ended by Datanet 30s with GE 115s in Seattle and Portland, Ore., and in San Francisco and Sacramento, Calif.

"Why are we getting out of the 400? Because the machines are old, 10 years old, and running out of gas. But Zellerbach doesn't want to be in the computer business. "We're in the paper business and prefer to let a powerful computer do the DP business," he said.

Zellerbach has now partially finished installing the IBM 370/158 with 2.5M bytes of real storage and 16M bytes of virtual storage. The system runs under OS/VS2 and has IMS for inquiry.,

Data 100 Keybatch systems are located in Seattle, Portland, Sacramento, Salt Lake City, San Francisco and Los Angeles with IBM 3270 clusters on-line to IMS, Smith noted.

Selection Procsss

Gamma indicated Zellerbach had gone into the selection process for the remote batch systems with some things already established. An extended systems needs analysis had already been done for the company, so user needs and what the system would have to do were known quantities.

"We also had 10 years' experience in remote job entry, so we had the historical information to give the various vendors for their proposals," he noted.

The most important thing in the selection process was to generate the best possible selection criteria so equipment could be chosen quickly — within 90 days — and logically. "This was essential because we had already begun hiring the additional staff. The GE equipment was dying slowly and it was the only thing keeping three of the regions alive," Gamma stated.

Gamma urged the attendees to develop their own criteria rather than rely on a book, for instance, because most of the criteria will relate specifically to the user's particular needs.

The selection criteria included seeing the equipment in actual operation, he said. Proven vendor maintenance service was also high on the list — in every location where Zellerbach could possibly think of installing the equipment. In addition, the equipment would have to support card-entry as well as key-to-disk operations.

The criteria further specified the equipment had to be capable of transmitting at various speeds, since variously sized systems were anticipated ranging from a couple of hundred transactions per day to several thousand, Gamma said. "We wanted to see the equipment doing these things in a shop, not just on paper," he said.

The system's peripherals would also have to include a wide range of capabilities in terms of disks, printers and memories.

The vendor also had to be able to indicate its future plans since Zellerbach knew the system would have to have Synchronous Data Link Control communications at some time.

The system would also have to have stand-alone capability and, finally, be price-competitive.

Narrowing the Possibilities

IBM, Data General Corp., Digital Equipment Corp., Burroughs, Xerox Data Systems and Data 100 were the vendors in contention for the bid, Gamma recalled.

A request for proposal was developed, including all key information on volumes, needs and criteria, and issued to the vendors.

Zellerbach also put together a selection team of its own, with one member working with each vendor to help it prepare its proposal and make sure all the data and criteria were understood.

The vendor list was narrowed down by looking at high-priority items in the proposals, he said. IBM, Data 100 and Xerox survived the cut.

"We then took the three remaining vendors and the three Zellerbach selection team members and gave them more details. All three Zellerbach employees worked with each of the vendors this time, explaining their weak points and where they were out of line in terms of dollars and so on," he said.

After narrowing the field further to Data 100 and IBM, Zellerbach developed a shopping list consisting of contract considerations to be asked for during negotiations.

"We chose Data 100 because it provided the equipment that day for our needs at that time, but already had equipment installed at other locations that would allow us to enlarge or upgrade our terminals without upgrading the control units. Data 100 was head and shoulders above all others," Gamma said.

But, he noted, "We took the equipment on a one-year lease only, with the idea of negotiating a long-range agreement after that time if the vendor had proven its viability and the quality of its equipment."

Zellerbach is currently negotiating that long-range deal with Data 100.

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Model Disproves Doomsayers, Finds Earth Can Support Growth

By Ann Dooley
Of the CW Staff

WALTHAM, Mass. — Doomsayers begone — the earth does have sufficient resources to support anticipated population growth with better living conditions and without damage to the planet's environment, according to the findings of a computer-based world economic model here.

Although the model, which was developed at Brandeis University, predicts an optimistic outlook for the next three decades, it was not intended for use in forecasting the future.

Instead, it was developed as a tool to analyze alternative development paths for the world economy.

The initial purpose of the project was to help the United Nations reevaluate growth goals for developing nations, according to Peter Petri, a Brandeis economist.

So far, the model has shown the limits to economic growth for these countries depend on political, social and economic changes rather than physical elements, he said.

The model consists of 15 submodels representing the economic structures of different regions and is comprised of 175 equations and 229 variables, Petri said.

The results are based on import/export relationships, services, capital and aid. The model also includes data on economic policies affecting trade, employment and savings.

Factors which include 29 industrial sectors, nine specific minerals, five agricultural commodity groups and 10 pollutants were studied to determine their effect on the interrelated world economy.

Statistical information includes figures on technology, population, pollution abatement, transportation, consumption, the consequences of alternative population growth rates and income per capita.

The data was analyzed for 1970 and then projected to the years 1980, 1990 and 2000, Petri said.

Generates Scenarios

The model is capable of generating a variety of scenarios, using as variables large-scale aid, low-interest loans and changing trade specialization to help ease the balance of payments for developing nations, according to Ann Carter, a project economist.

The model indicated that programs on land reclamation, irrigation, public and private investment, credit facilities, supply of machinery and resettlement of agricultural labor are the kinds of reform necessary for improvement of third-world incomes, Petri said.

The model determines the effect of various hypothetical conditions on each sector of each region's economy. One scenario, for example, answers the question of what would happen to the required food production of an economy if its balance of payments deteriorated.

Its effects on other countries could also be studied through its relationships in the world market, Petri said.

The program was designed to provide a variety of answers, not just a one-shot solution, he said.

The system solves and stores a scenario for each year and allows many alternative changes to be worked through and stored. Such updates can be recalled or recombined at any time to reflect changes in the economic situation, Petri explained.

The work was modeled on a Digital Equipment Corp. Decsystem-10 at Brandeis' Feldberg Computer Center. It is a time-sharing interactive I/O system that supports programs written in Fortran.

All systems are stored on magnetic tape and dynamic core allocation allows recycling of the work core, Petri said.

Installing Duplicate Model

The UN is currently installing a duplicate model in New York. The system is undergoing some recoding and redesign to facilitate the UN's own IBM system, according to Richard Drost, project programmer analyst.

The original model will stay at Brandeis, where it will be available for future research and for use by institutions other than the UN, such as the U.S. Department of Commerce and the World Bank, which have already expressed interest, Petri said.

There is some doubt whether funds for continued research and updating of the data base will be provided, however. Since the UN has received data on its initial request, it has been slow to continue sponsorship of the project, according to team members.

Since the model would provide answers for governments and industry, researchers are hopeful of continued implementation.

"If we are able to obtain adequate funding, the Brandeis model will be kept current and effective as a tool for further use," Carter stated.

Calendar

May 15-18, New Orleans — 1977 National Operations and Automation Conference, sponsored by the American Bankers Association (ABA). Contact: Constance Williams, Conference Coordinator, Operations and Automation Division, ABA, 1120 Connecticut Ave. N.W., Washington, D.C. 20036.

May 16-18, Philadelphia — **American Society for Quality Control (ASQC) 31st Annual Technical Conference.** Contact: Darlene C. Schmidt, ASQC, 161 W. Wisconsin Ave., Milwaukee, Wis. 53203.

May 16-18, Arlington, Va. — **Electronic Components Conference**, sponsored by Electronic Industries Association (EIA) and the Parts, Hybrids and Packaging Group of the Institute of Electrical and Electronics Engineers. Contact: Tyler Nourse, EIA, 2001 Eye St. N.W., Washington, D.C. 20006.

May 17-19, Charleston, W. Va. — **23rd Annual Instrument Society of America Analysis Instrumentation Symposium**. Contact: Bill Wagner, Union Carbide Corp., Box 8361, S. Charleston, W. Va. 25303.

May 17-20, Dallas — **Dynamics of Micrographics**, sponsored by National Micrographics Association (NMA). Contact: Barry Erdeljon, NMA, 8728 Colesville Road, Silver Spring, Md. 20910.

May 17-19, Philadelphia — **Nepscon 77 East**. Contact: Industrial & Scientific Conference Management, Inc., 222 W. Adams St., Chicago, Ill. 60606.

May 19, Gaithersburg, Md. — **Computer Security and Integrity — Trends and Applications**. Contact: Trends and Applications, P.O. Box 639, Silver Spring, Md. 20901.

May 19-20, New Haven, Conn. — **Necon 77**, sponsored by Data Processing Management Association (DPMA). Contact: Necon 77, DPMA, P.O. Box 3024, Bridgeport, Conn. 06605.

May 19-21, Syracuse, N.Y. — **The Value of Information**, sponsored by the American Society for Information Science (Asis). Contact: Asis, 1155 Sixteenth St. N.W., Washington, D.C. 20036.

May 23-26, New York — **Data Base: The Practical Issues**, sponsored by the Association for Computing Machinery (ACM). Contact: ACM Greater New York Regional Conference, c/o Sysdoc, Inc., 60 E. 42nd St., New York, N.Y. 10017.

HIS Phoenix Reclamation Center Salvaging More Than Machines

Steve Argusta, 17, disassembles an older model HIS system traded for a Level 66 system. By the time he completes this project, he will have mastered everything in the disassembly course.

PHOENIX — People as well as computer components are being recycled in a small, bustling factory on Apache Street here.

Obsolete computer systems are disassembled at Honeywell Information Systems, Inc.'s reclamation operation and reduced to thousands of electronic components, miles of wire and pounds of metal by inner-city high school students enrolled in a work-experience program.

As many as 12 students at a time spend three months picking up basic shop and tool skills; learning assembly/disassembly of mechanical, electrical and electronic units; studying warehousing and practicing retail shopkeeping.

Dick Hotaling, manager of the Apache Street Facility, was instrumental in creating the program.

"At first we worked with adults considered the 'hard-core unemployed.' Of 58 who entered the program during a six-year period, half were eventually placed at HIS' manufacturing facilities in Phoenix and with other employers in the area," he said.

"In 1974 we decided to work with youngsters," he continued. "The original concepts, however, have remained the same: learning how to handle tools, maintain inventories and serve customers."

Candidates for the program are identified with the help of local schools and minority organizations such as the Phoenix Urban League, Phoenix Opportunities Industrialization Center and Service-Education-Redevelopment.

"From the moment a piece of old equipment enters the Apache Street Facility until it is reborn as a marketable component, it is totally entrusted to the students," Hotaling said. "We train them how to use tools, tell them why certain parts are important and how to prepare materials for resale.

"The rest is up to the kids."

Harm to Phone Network Assured By Interconnect Policy: AT&Ter

By John P. Hebert
Of the CW Staff

ATLANTA — The switched telephone network in this country "will start to go bad" in the near future as a direct result of technical harm resulting from the interconnection of non-AT&T terminal equipment.

That prediction was made by Robert B. Brunson, AT&T's manager of staff, who appeared on a five-person conference panel here recently. His charge was declared to be unsubstantiated by Walter Hinchman, chief of the Federal Communications Commission's (FCC) Common Carrier Bureau.

Hinchman noted the case in support of terminal interconnect equipment has been upheld by the Fourth Circuit Court in Washington, D.C.

He assured an audience at the third of five debates here on the Consumer Communications Reform Act of 1976 that the FCC wants to get the interconnect problem resolved.

"Let's give the Bell Bill debate a decent burial," he told cospeakers Brunson, Neil A. Swift of the New York Public Service Commission (NYPSC) and Jack Herrington, director of government relations with the U.S. Independent Telephone Association (Usita).

The FCC has instituted a joint federal-state board to study the telephone companies which comprise the Bell System to see if they have been adversely affected by user interconnection of independent terminal equipment, Hinchman noted.

On the issue of interconnect competition, Swift said competition for its own sake won't work, but in the case of terminal equipment, "true," unregulated competition would be good for the user.

Specifically, telephone companies in New York State have been "skimming the cream" from their lucrative, overpriced telephone market to support their terminal equipment market, Swift charged.

"Simply stated, the [telephone] industry is not making money in the terminal equipment market and hasn't been for years," he told panel members and attendees, citing studies conducted by the NYPSC staff.

The result of the studies, he said, has been the same for New York Telephone (NYT) as well as several other independent telephone companies in the state: "No company is garnering enough revenue to meet its costs of providing terminal equipment," Swift said.

"The results of our studies have convinced me the [telephone] industry will not suffer, nor will its customers, due to terminal equipment competition," he said, adding there may be some "dislocation" in the short run.

Instead of using the "tremendous capabilities" in size and revenue for competing head-to-head, "Bell chooses rather to scamper from one regulatory forum to another screaming for protection," he said.

As a result of its study, NYPSC directed NYT to increase its terminal equipment revenues by 25%, effective Nov. 1, 1975.

After the increase, NYT's terminal revenues grew faster than before and it is now enjoying about 95% of the terminal equipment market, Swift noted.

"If we are to have competition in the terminal equipment market, let's have real competition. If the industry giants — Bell, IBM and AT&T — as well as the innovative smaller companies meet head-to-head in this market, then the consumer will be the ultimate beneficiary," Swift said.

But the long-term effects of such competition, according to AT&T's Brunson, will be adverse.

Arguing for the Bell Bill provision which would allow each state to decide its own interconnection standards and requirements, Brunson said if the states have jurisdiction, they will be as responsible as the FCC for developing a uniform set of standards.

Today's terminal equipment offered by the independent manufacturers will not be around in the years to come, Brunson said, but the network will be around and it must be protected.

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More Than Money Seen Key to Mini Acquisition Terms

By Toni Wiseman
Of the CW Staff

SAN FRANCISCO — Mainframe users are often faced with the decision to buy, lease or rent their equipment, but in the minicomputer area that decision is complicated by such factors as novelty of systems and lack of supply, Computer Caravan attendees were told here recently.

The city of San Francisco has found it cheaper to buy its equipment than to lease it, according to Tom Gerraughty, assistant DP manager. In addition, the city has been able to recoup some of its money by reselling equipment when it was outgrown or obsolete.

"When you run 24 hours a day and are liable to run more than the number of hours specified in your rental contract, we've found it's cheaper to buy," he told the audience.

Paul Ray, a partner in the firm of R.R. Associates, noted the majority of minicomputer manufacturers do not lease or rent their equipment.

This is because of the competitiveness of the market, he said. "If a company committed resources to that kind of dealings, someone would have to pay for it in the end, and that would be the user.

"Since the mini market is so price-competitive, leasing is probably the last area it will get into," he said, noting there are plenty of banks and other firms very anxious to get into third-party lease arrangements.

Plan for Obsolescence

Ken Harms, deputy associate laboratory director for administration at the Far West Laboratory for Educational Research and Development, said his firm has purchased and rented equipment as well as leased from the manufacturer and third parties.

"The problem with buying a minicomputer is that you have to plan for obsolescence. For that reason, we bought a mini that would do five times the work we needed. We don't care that it isn't the newest or fastest machine," Harms said.

"The important thing is to make sure that when you're through paying for it, you have a machine you can use," he emphasized.

Fred Jensen, senior systems analyst at the U.S. Postal Service in Sacramento, Calif., has purchased minis and leased terminals in his DP shop. He agreed with Harms that a purchased machine has to be big enough to allow the firm to grow.

"Our machine is undoubtedly larger than what will be needed, but we will be doing development work on it. We also allowed for the fact that it is generally nonexpandable," he said.

'Garage Sale' Situation

Jensen noted a company contracting for a turnkey system "should be very very careful about purchasing a piece of hardware, because if you outgrow it there is nothing to do but hold a garage sale."

David Waseley, associate development engineer at the University of California at Berkeley, told the audience the difference between the price of a three-year-old mini and a new one may not be that great because of the decrease in mini prices in recent years.

In addition, a user looking for a used machine may not be able to purchase the exact model he had in mind. But there are savings to be had in the used minicomputer market and it is worth considering, he said.

Afips President To Address NCC On Industrial DP

DALLAS — Dr. Theodore J. Williams, president of the American Federation of Information Processing Societies, Inc. (Afips), will address National Computer Conference (NCC) attendees on the role computers play in industrial systems.

An area whose importance "cannot be overestimated in terms of its impact upon production efficiency, quality control and related areas vital to our economy," computers help American industry remain competitive in the world marketplace, according to Williams.

The application of computers in industrial process monitoring and control is of paramount importance if the most effective utilization of raw materials, energy, manpower and related corporate resources are to be achieved.

In addition to his position as Afips' president, Williams is professor of engineering and director of the Purdue Laboratory for Applied Industrial Control at Purdue University and a past president of the Instrument Society of America.

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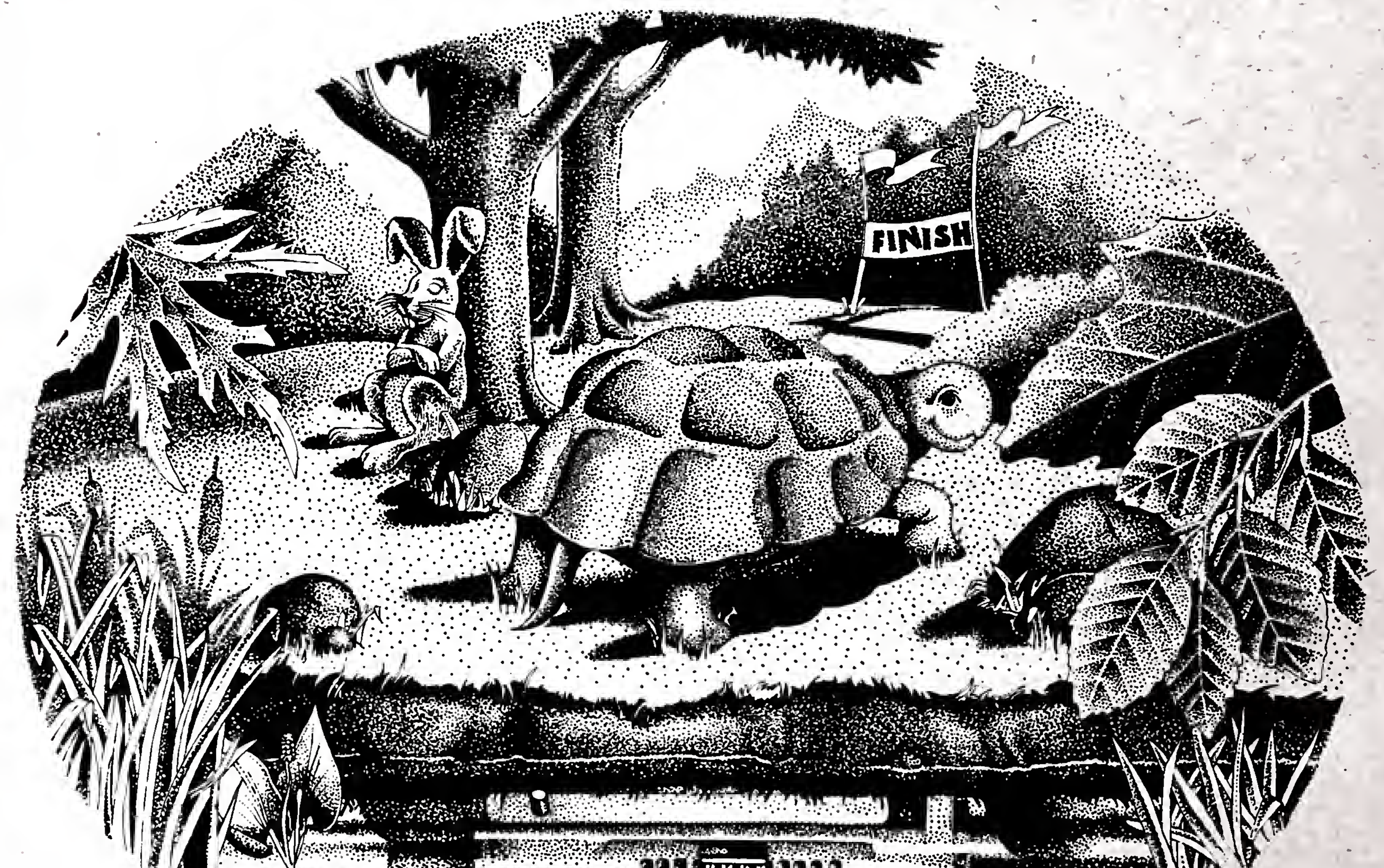

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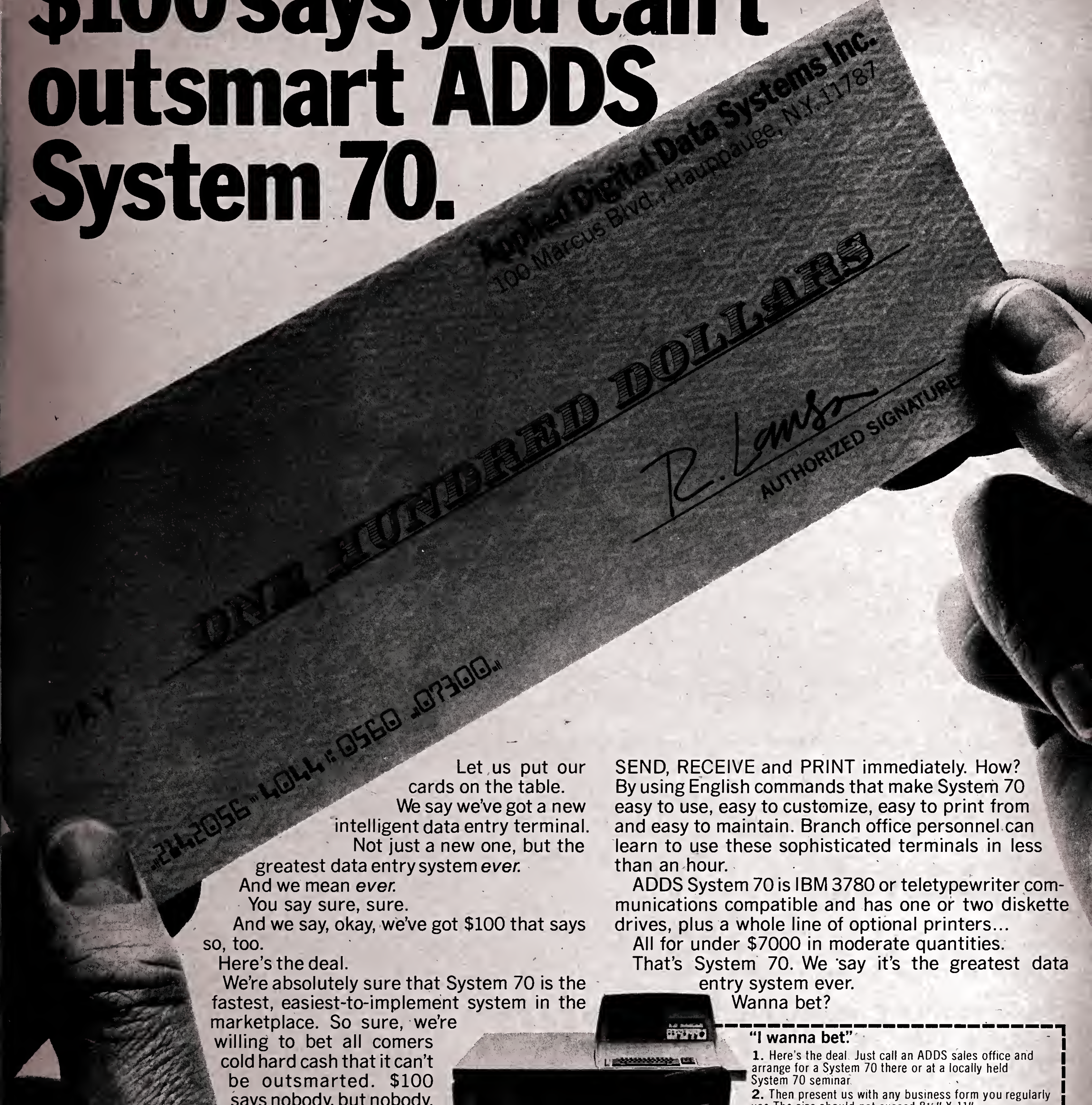
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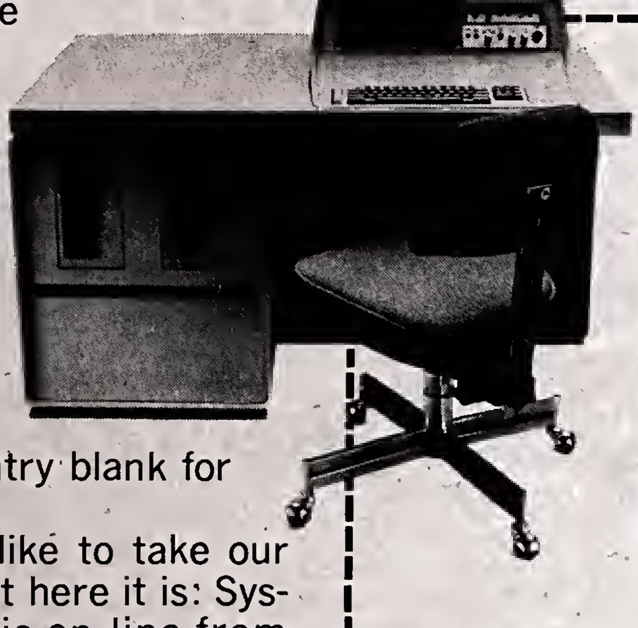

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Questions Urged on Users Debating Software Options

By Toni Wiseman
Of the CW Staff

SAN FRANCISCO — Most users are aware there are three alternatives for software — in-house development, purchased packages and custom-designed systems from software houses — but the big question is, "When should I go outside as opposed to having my staff develop the needed software?"

Leslie E. Wall, director of DP and special projects at Washington Physician's Service, told a Computer Caravan session here that before answering that question, some other facts must be established: what type of application is needed? An operating system? A utility-type program? A broad applications package such as payroll or general-ledger? Or a more tailored application like an automated claims-processing system?

When must the system be in place? "Time and money would probably answer this question," he noted.

What hardware configuration will be doing the processing? Is the machine only half the size of those doing similar processing? Or is there any similar processing going on at all? Any special equipment requirements?

How Good is the Staff?

How experienced is the staff that would be working on the project?

Who would be involved in the project and what is the project review plan?

While answering these and perhaps a few more questions that may be pertinent to his installation, the DP manager should also begin the system development process, Wall told the Computer Users' Forum.

The creation of any new system has some basic phases which must be completed successfully. These include system planning, system design, programming, testing, implementation and maintenance, he suggested.

System planning includes requirements specifications and good solid documentation; this step is necessary regardless of the software alternative chosen, Wall said.

System design, however, depends on whether the software is purchased or built. "However, if the decision is to purchase, some work must be accomplished to interface the new system [with] the other systems, the hardware and the total environment. The test plan will still have to be developed thoroughly," he stated.

Documentation Vital

In terms of programming, Wall cautioned attendees to be sure there is good documentation if the decision has been made to purchase a package. Documentation is particularly important if interfacing or conversion programs will be required.

Implementation and training are two steps that will be required no matter which alternative is chosen, Wall said, as will maintenance and review and enhancement phases.

If a user is sure a software package is available that will meet his needs, what should he do next? Wall described the method his installation used in selecting a teleprocessing monitor.

The first step was to set up an evaluation team comprised of experts from within the DP department. This team knew what the user's concerns were and also what the corporation's long-term plans were.

"Where did we go to get some information on the dozen or so monitors that were available? We had talked to a few salespeople who were interested in having us purchase their software, but we found the best place for this information was in a publication called the *International Computer Programs Software Directory.*

"If necessary, we could then contact the sales representative," Wall said.

Weighted Factors

A list of criteria was then drawn up and a method of weighting each item was determined. "In our case, we did end up with the highest rated, but it would not have been wrong to select the second one," he said.

Wall said it is possible to get a very effective custom-designed system, but emphasized the user must still do some of the groundwork himself. It would be wrong, for instance, to allow the designer to identify the site's problems and then state the requirements for the system.

The remaining steps of the development process can be left largely to the designer, but user involvement remains crucial, he stressed. "No system will run in a vacuum — you must understand it and be involved with testing and training.

"The total amount of the contract for outside work will represent about 60% of the total cost to you to develop the system. With a maximum of 70%, you may be giving away too much to expect a successful implementation and on-going system," he stated.

Wall concluded by saying, "To be the most effective DP department, I believe you will have to have a mix of purchased packages in your shop."

Model Predicts Yield Of Growing Wheat

CLEMSON, S.C.— The nation's future wheat yield can now be determined by using a computer to predict quickly and accurately the coming season's crop.

The computer model, developed by Joseph Haun, a professor at Clemson University here, cannot forecast on a long-range basis. Rather, it predicts what the coming crop will be according to all the presently known variables, Haun said.

Data on the maximum and minimum daily temperatures and the amount of daily rainfall are entered into the university's IBM 370/165 system which runs multiple regression analyses on the data, he said.

Besides the complex environmental relationships, technological variables such as the type of fertilizer used are also entered into the analyses.

Daily Responses

The daily data is critical to the model's accuracy, Haun noted. "Plants respond to weather in certain ways," he explained.

"From the collected data, we can use the equations to predict daily development for a sample of plants in a field," he said. "Then, once daily growth and development are plotted, the expected yield can be predicted."

The only other method for determining wheat yield has been for farmers to observe their crops and send in reports to the U.S. Department of Agriculture. This process is more lengthy and subjective, Haun said.

Encompassing 10 years of research, the project is being funded by the National Aeronautics and Space Administration as part of weather satellite research.

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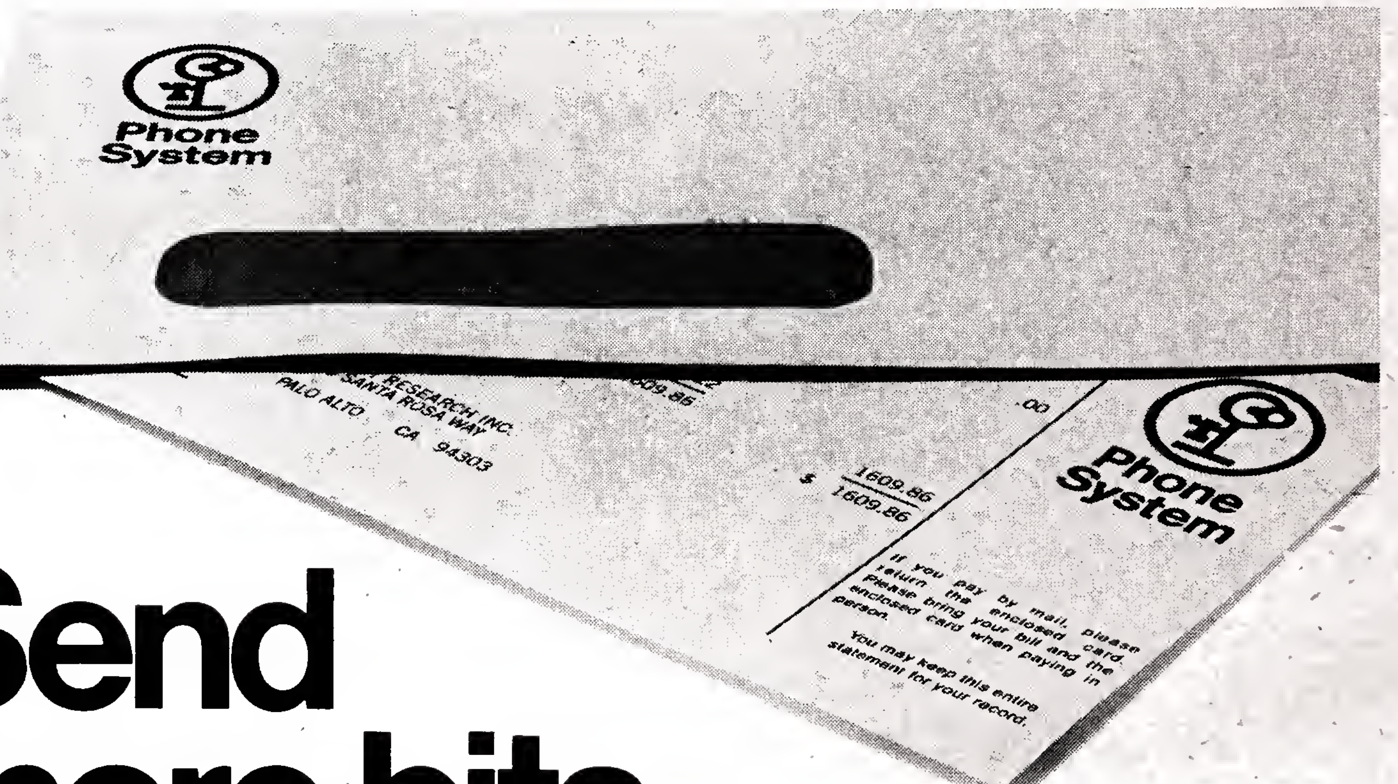
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Editorial

The DAA Lesson

The first noncarrier data sets are now being directly connected to the phone network. The first device to be approved by the Federal Communications Commission was a Vadic Corp. data set which passed the technical requirements spelled out in Part 68 of the commission's rules [CW, April 4].

Modems which are approved under this certification registration procedure can be connected using the plug-and-jack arrangement which will soon become standard in this type of installation.

Users will need to have only a jack installed by the phone company in order to attach registered data sets and other devices to the network. Bell companies will charge about $30 to install a data jack, but this is the only one-time cost that will be required. In return, the Data Access Arrangement (DAA) can be retired and returned to the phone company.

There was never any doubt in the minds of users that the DAA was an unnecessary device fostered by AT&T as a revenue-generating box to guard against the elusive phantom called "harm to the network."

Despite the many Bell claims, instances of harm were never documented before the FCC and technical justification for the DAAs may never have existed.

The tragedy of this entire proceeding is that it took years to resolve. While the issues were being debated — first before the commission and then in the courts — users were paying their monthly tribute into the AT&T coffers in the form of DAA rentals.

It is ironic none of the parties that have argued the endless positions have raised the point of repaying the users for all the DAAs that operated for many years in front of noncarrier data sets.

Presumably Bell knows how much revenue was generated by the DAAs and other connecting arrangements during the long smoldering debates on direct connection. What we will never know is how many users selected telephone company data sets or other equipment because of the artificial red tape associated with having to install the proper connecting device.

Clearly the Bell System used the protection of the regulatory umbrella to develop obstructionist tactics that delayed direct interconnection for years. Today the attention of the regulatory reformers and congressional committees is focused on rewriting the Communications Act. In the course of these deliberations, it is to be hoped that the lesson of the unnecessary connecting arrangements fostered by AT&T and sanctioned by the FCC will not go unnoticed.

Regulation was designed to look after the interests of the users as well as the carriers. In the case of interconnection, the user has had to live with requirements which cost time and money. And as W.C. Fields used to say, there was nothing else left to give.

Hopefully, any future revision of the Communications Act will give the user interest a higher priority. Most users are willing to forget what has happened. They hope that the DAA will soon be little more than a museum curiosity. But they want the regulators to pay more attention to their interests in the future.

'Man, That's a Lotta Skivvies . . .'

Letters to the Editor

Software Persons Must Protect First Amendment Right Everywhere

Congratulations to Central Computing Services, Inc. and its president, Dewey H. Crim, for opposing the taxation of software as tangible personal property in Alabama and winning [CW, March 21].

Governmental confusion about the nature of software has resulted from IBM's unbundling in 1969 and a failure since then by our industry to educate the legislative branch of government to the changed factual situation of unbundled software.

As a $24 billion national industry, we must actively protect our First Amendment right everywhere. Allowing another ruling, rule or "clarification" to be made largely ex parte taxing that right constitutes a damaging apathy — a giant waiver of our precious right to be heard in the legislative branch.

Once promulgated, agency rules are customarily considered persuasive by the courts unless clearly unconstitutional or inconsistent.

In my opinion, software persons in New York are committing a grave error in giving government the ex parte opportunity to tax us, rather than by taking the initiative to have our cause heard before a hearing examiner in a trial-like hearing under the Administrative Procedure Act.

Robert M. Sherin

Miami, Fla.

Programmers Can't Kill Patients

The Ken Lord column entitled "Medical Surveillance Systems: Who Ensures Safety of Patient?" [CW, Feb. 28] gave the impression it would be possible to program a medical computer to kill a patient.

This is, fortunately, a very naive view. Responsibility for the safety and well-being of a patient in a hospital is in the hands of the patient's physician. The physician may employ sophisticated equipment, or even delegate authority to others, but he remains the final arbiter of the quality of patient care.

A clever programmer could certainly cause a computer to produce incorrect results based on medical input, but he would have a hard time having any direct effect on a patient by doing so. There is one protection against this in every patient monitoring system that we know of: They are all designed for the contingency of catastrophic failure.

One could completely remove the computer from any of these systems and the bedside monitors and nursing station equipment would continue to function in a way that would allow patient care to proceed.

The computer provides an edge over conventional monitoring techniques, but it is by no means essential to the safety of the patient. Even in cases where the computer provides closed-loop control over drug, blood and fluid infusion to the patient, the hardware to deliver the treatment is designed to operate in a manual mode as well and has alarms to prevent the delivery of treatment out of prespecified ranges. The hardware is structured so these alarms cannot be overridden under program control.

All of the above is still no excuse for the lack of standardization and control over the development of such systems. The problem is not a medical one; it is an industrywide problem that affects all of us.

At this time it would be impossible to write effective legislation governing standardization of programs and programmers because no one can define a standard for proof of program correctness. Any legislative action which might be precipitously taken would lead to one of two things — either a complete elimination of such systems or a false sense of security that we are now protected by laws about programs and programmers.

Bob Harbort
Crawford W. Long Memorial Hospital
Bob Brown
Medical Association of Georgia
D.R. Mahan, M.D.

Atlanta, Ga.

Data Past

Five Years Ago
April 12, 1972

RICHMOND, Va. — The Computer Co. released the first version of its Extended Disk Operating System (Edos) which added a range of features, incuding control of six separate partitions, to IBM's DOS Release 26. The spokesmen stressed Edos was an extension of the stabilized IBM release and therefore gave the system enhancements to the 360 user who did not want to move up to the 370.

— — —

LOUISVILLE, Colo. — Storage Technology Corp. introduced a series of IBM-compatible magnetic tape systems that could read and write standard magnetic tape at a recording density of 3,200 bit/in.

Eight Years Ago
April 16, 1969

MINNEAPOLIS — A U.S. court awarded an automobile wholesaler $480,811 in damages against IBM's Service Bureau Corp. for fraud and misrepresentation.

— — —

OTTAWA — Cobol-68, the improved version of Cobol, was published by the Canadian government ahead of its U.S. printing.

Approved by the Conference of Data Systems Languages (Codasyl), Cobol-68 differed from the USA Standard Institute's Standard Cobol because it included language developments which took place since 1965; the U.S. Cobol specifications were frozen in 1965.

Vendor Failures Cause Problems Beyond User Control

The Human Connection

By Jack Stone

Special to Computerworld

"I can't believe it! I just can't believe it! After all that's gone on, they did it to us again!"

A manager in one of the largest computer centers in the country was complaining to me about the lack of performance in the advanced multiprocessing software provided to him by a major hardware vendor.

He went on, quite unhappily: "I simply can't understand the vendor. Here we are, one of its largest customers, with millions upon millions of dollars worth of its hardware installed, relying on the delivery of its loosely coupled multiprocessing software to make our current hardware more efficient.

"However, after installation and test, we found the software so unreliable as to be unusable, forcing us to defer our production dates after the new hardware was already installed."

Big Promises

As I pondered this manager's anguish, I recalled many other discussions I have had with operations managers, technical support personnel and systems programmers in large-scale installations. We had talked, both at their installations and at user meetings, about their relationships with mainframe and peripheral equipment vendors and, I'm afraid, it's a rather sorry tale.

The general complaint seems to be that the vendors continue to promise more than is actually delivered, a situation which obviously causes a rapid deterioration in the credibility of the vendors with the customer and seriously affects the capability of the customer organization to meet its commitments.

I believe the experiences of my contacts are typical of many installations and there are several aspects of this problem which have considerable significance to the industry as well as to the user community. It clearly is one of the more pressing of contemporary DP management issues.

Items of Concern

First, great concern was expressed about the continuing problem of deliveries from the vendors of complex software systems. Certainly, much progress has been made in the development and use of improved productivity techniques, project management controls and programming systems planning.

But no matter how critical a solution to this problem would seem to be for the business health — if not the survival — of some vendors, there is no solution and the problem appears to persist uniformly throughout the industry.

Second, even though many people now recognize the systems development process is complicated and the software systems now being built are extremely intricate, that's hardly an excuse for late deliveries, particularly now that the software industry is maturing.

The point is simply this: When a vendor makes a delivery commitment, the customer has to be able to accept that in order to commit and expend his own resources in preparation for the promised delivery. When the primary schedule is not met, the fault usually lies with vendor management and not with the technical people who may be struggling to meet impossible deadlines.

Third, failure to have on-time delivery of programming systems that meet agreed-upon specifications is hardly the only complaint users have against mainframe and peripheral hardware vendors. Maintenance support, systems engineering services, documentation, technical training (particularly at the advanced levels) and general responsiveness to business problems have all been targets of severe customer criticism.

The manager quoted above represented the views of many large-scale system users when he told me, "After the hardware is installed and income is accruing to the vendor, we literally have to threaten to throw out the hardware to receive the support services that were promised to us.

"What has been very discouraging is that vendor attitudes toward follow-up support have been universally poor. When there is a vendor hassle about hardware/software problems — we are a multiple-vendor installation — we receive a solution quickly only when senior management from both sides becomes involved.

"Frankly, we are bitter about what the vendors have done to us and are all the more frustrated because we have become inextricably locked into the mainframe vendor since the time, money and manpower it would take to convert to another vendor is overwhelming.

"Another particularly irksome practice of mainframe vendors is to send us recent college graduates in the guise of trained systems engineers; we end up, in effect, providing them with an on-the-job training environment.

"From my discussions at user meetings — which I attend regularly — I have to estimate that perhaps 75% of the large installations are unhappy with some aspect of vendor support."

Charges of overselling and overcommitment on the part of the large-system vendors have run rampant through this industry since its early days. Although many of these charges derive from legitimate misunderstandings between customers and vendors, numerous well-known cases can be cited which derive from mismanagement on the part of the vendor.

Responsibility to Rebuild

Since the credibility of large users in their vendors has been sorely tested, I believe the vendors have the responsibility, in their own interests at least, to take steps to rebuild a high level of confidence in their product agreements, from specifications to delivery schedules to follow-up support.

To set the record straight at the beginning of this renaissance, I think it would be useful for vendors to publish statistics on recent product delivery performance. If desired, I will provide space in this column for major vendors to present these facts.

Second, I believe it is time for the pertinent vendors to commit themselves to hardware reliability figures. The absence of such figures makes it very difficult for customers to plan for backup hardware and related recovery capabilities. In addition, most customers feel they are being deceived without such "specs."

Third, vendors should commit to adequate programs for hardware and software performance measurement. Customers continue to bristle at what appears to be a deliberate attempt by the vendors to keep vital performance data from them.

Fourth, vendor management should stop, once and for all, announcing products whose development and management cannot be properly supported. The entire DP community appreciates the competitive pressures that force hasty product announcements, but we also recognize that a shoddy product tarnishes the professional integrity of the people in the community as well as the particular vendor.

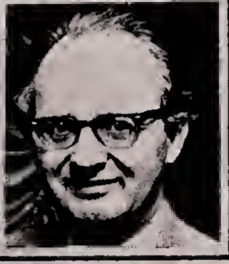
Comments regarding this column or any aspect of human relations in the DP setting should be sent to Stone, Suite 222, 2233 Wisconsin Ave. N.W., Washington, D.C. 20007.

Virtual Record Systems Make File Changes Practical

The Taylor Report

By

Alan Taylor, CDP



The concept of "virtual records" developed by Richard Haasz of Metropolitan Dade County [CW, March 21] is worth more than a quick look. While Haasz naturally concentrated his attention upon the use of this method when incorporated into a new system, virtual records show other important characteristics when considered in the light of existing systems.

They also make it just about mandatory for an auditor to be prepared to physically examine every bit of a file.

Haasz pointed out that a virtual record system will keep on running after fixed record systems normally break down because of the uneconomical costs of keeping them up to users' requirements. So, for instance, if some new regulations, a new company policy or just a new management idea on data requirements comes up after a system is in use, there is a distinct possibility with physical records that the cost of producing a modified physical record system will delay the improvement until the system is completely rewritten.

As such unexpected requirements seem to happen almost annually in most systems, by the time three or four years have gone by and the fixed record system is less than satisfactory in three or four major ways, there is a solid base for suggesting creation of a new physical record system.

What Haasz did not discuss was that the cost of modifying a physical record system, rather than starting out all over again, is also greatly reduced by the virtual record concept. In fact, instead of building a new system, it is possible to convert from a physical record system to a virtual record system by incorporating the simple data compression/data expansion (DCDE) routines first and then making the system changes to keep the old system running.

Basically, this change involves treating the various file descriptions, but leaves the logic just as the original programmer wrote it and includes all the changes made for operational and other reasons through the years.

Answer to Design Problems

This ability to permit easy maintenance of currently standard physical record systems is particularly important because it provides us at last with an answer to those design problems which we wish were not there — such as an inability to separate knowing that a person does not speak German from not knowing whether or not he speaks German.

These limitations have a way of making it seem that the computer — and not the corporation that owns the computer — is running the business. They are in fact the technical base for the perennial excuse: "That's the way the computer works; there's nothing we can do about it."

And, true enough, there was nothing that could be done about it previously except develop a whole new system. However, with the ability to first make the system a virtual record one and then incorporate the necessary fields and data in the records without blowing disk space, it becomes clear the computer can be a servant and need not be the master.

Auditing Problems

A second area in the development of virtual record systems that requires some attention deals with the question of system auditing. Recently we have been told of the comparative failure of internal auditors to notice computer crimes.

Certainly there will be more attention given to how well an auditor of any type — internal or external — is doing his job, but the use of virtual record systems adds a further complexity which should be taken into account.

In virtual record systems different parts of a program can be set up to look at different versions of a record. Some look at the full expanded file and some look at smaller subsets.

The DCDE routines Haasz suggested for this use (which are not the same as DCDE routines for communications or any other use, incidentally) effectively eliminate excess zeros and low values. They also encourage the use of large virtual fields with plenty of zeros, blanks, etc.

In looking for program errors or programs that have been improperly modified, the current standard method is to see that there are no unused fields a forger could use for his own purposes. This is quite simple, because there is only one file description for any file. It is sufficient to check it and check that the record samples under examination match it.

Field Detection Difficult

With virtual record systems, however, this is not so easy. A field can easily be hidden in the excess leading zero areas of other fields and cannot be detected by inspecting the program listings. In fact, it can only be detected by literally suddenly dumping a program while in practical use for an improper purpose.

All the forger would have to manage would be to simply provide a different extended file description — including the hidden fields — on the few occasions that he wanted it to run in some unauthorized manner.

Auditors looking at virtual record systems, therefore, have to bear the new flexibility of record descriptions in mind. What the final answer will be I don't know, but at the least it seems to involve a full character-by-character inspection of the virtual file for discrepancies — such as characters in high-order positions that don't go with the reported field contents.

It is certainly a lot of work, but with the departure of one of the few items that could be relied upon — the file description itself — I don't see any easy way out if an audit is to be performed.

Effectively, we have now lost the connection between the bits and bytes on the files and their interpretation by the programs. This is almost as bad as having lost the hard-copy files input into the computer system in the first place. And you know how distressing that was to auditors until they learned how to write their own programs for examining files.

With these caveats, however, I think the work on virtual records is very important. In particular, the discovery that the DCDE routines couldn't just be copied but had to be thought out from scratch has shown the way to hardware-independent record descriptions that can be kept up-to-date..

The proof of the pudding, of course, is in the eating. The first all-new system incorporating virtual records is the Metropolitan County of Dade alimony/support system. It is due to become operational late this year.

If it works well, then the concept will, I think, be proved. But even if it doesn't, someone else will pick up the idea and find the right combination for the crucial DCDE routines. And that won't take long.

So, in any event, virtual records are coming — and we should be ready for them.

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Letters to the Editor

CW Did Service With Employment Survey

How can Frank A. Crocitto condemn *Computerworld* [CW, March 28] for reporting the facts ("Now's the Time to Dust Off Your Resume," CW, March 14) and being loyal to the people that justify CW's existence?

Maybe it is Crocitto who is suffering from misplaced loyalty. After all, there are analysts and programmers breaking their backs for him and his center. What is he doing for them?

I'll tell Crocitto how to make his job easier: Provide that programmer with better working conditions. Give that overworked, loyal systems analyst a more competitive salary.

Thank you, CW, for the information.

Evans C. Harris Jr.
Programmer/Analyst
Greenville, N.C.

Good Idea

If Cichelli & Cichelli were saying [CW, Feb. 21] what I think they were, then I agree that their idea of trunks is a very good one.

In fact, we have such a set of trunks designed specifically for business applications. We use it all the time, and it definitely aids programmer productivity. Our set of trunks is called Mark IV.

Robert A. Wonderly
Colton, Calif.

Wygant Unfair

Having been a student of Martha Cichelli, I can testify to the advantages to be gained through the application of ideas behind goal-directed, top-down structured programming. I suggest that Laurance F. Wygant [CW, March 14] take the time to study and apply these methods before he condemns them.

If he does this, he should discover that programming will become more interesting. Also, his programs will be easier to write, maintain and modify if the need arises.

As for the use of "trunks" in programming, my thoughts run toward the positive on this idea. Just imagine how much time could be saved by a programmer if several standard routines, such as the Cichellis described, existed in business shops.

But who needs GOTOs? Why not use PERFORMs? One perform loop, covering several paragraphs, is a lot more effective than several GOTOs, and the program is much simpler to follow.

Granted, PERFORMs take more core than GOTOs, but on modern-day machines this shouldn't cause any major problems.

The DP industry needs more progressive thinking people like the Cichellis, or it will progress to the heights of incompetence.

So don't stop them, listen to them.

James B. Siegfried
Bethlehem, Pa.

Forget Something?

I found the timely small business computer comparison ["IBM 32 Alternatives Found Numerous, Less Expensive," CW, March 7] lacking only two important points as I read it.

I found myself wondering about the programming languages used with the various computers. I was also quite disappointed not to find GRI Computer Corp.'s System 99 mentioned.

The basic GRI System 99 is priced at $33,000. At that price we offer 32K bytes of main memory, 10.6M bytes of drive (fixed plus removable IBM 5440-type cartridge), a 100 char./sec printer and a CRT terminal.

The System 99 supports a unique, interactive IBM-compatible RPG-II and a full complement of utilities and communications software. GRI offers applications software products and will soon announce its first industry-oriented application.

Saul B. Dinman
Executive Vice-President
GRI Computer Corp.
Newton, Mass.

GGWLWID

Congratulations to Miles Benson on his article, "Programming Language Often Only a Status Symbol" [CW, March 21].

I believe he has spoken a great truth. In fact, I have even named a language myself, GGWLWID (Golly Gee Whiz, Look What I Did).

Actually, I have not done it yet. I expect to leave it in the far recesses of the mind where a lot of other languages belong.

Elton Eske

Computerworld welcomes comments from its readers. Letters should be addressed to: Editor, Computerworld, 797 Washington St., Newton, Mass. 02160.

The '77 National Computer Conference: a unique learning experience

For the individual with a need to know, the 1977 National Computer Conference, June 13-16 in Dallas, offers a wealth of information on computer technology and data processing applications. It's all available at one time, in one place — a record-breaking exhibit of more than 1,100 booths; an extensive conference program covering the latest in technology, cost-effective computer usage, management concerns, and public policy issues.

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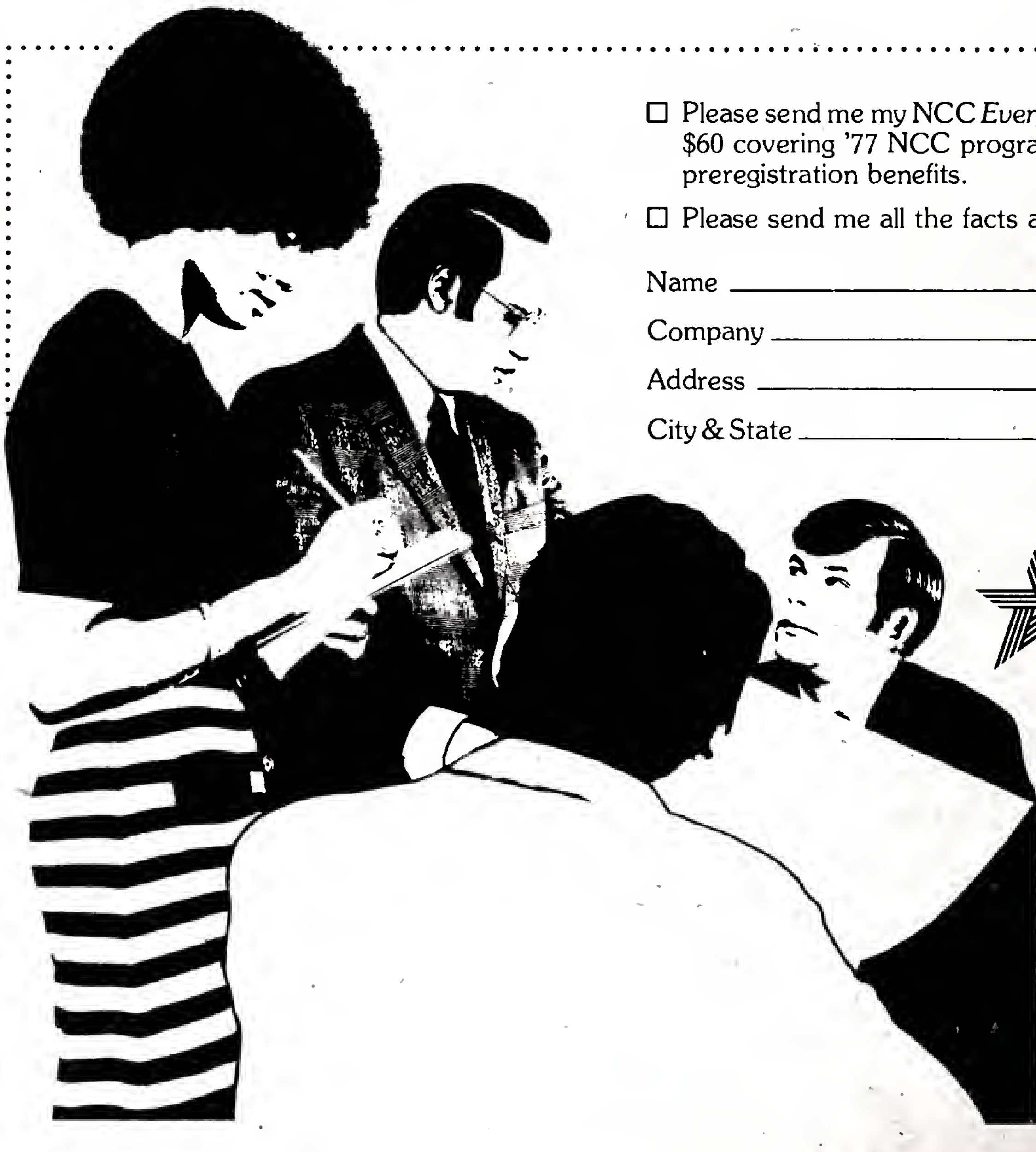

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Operating speed is maximized with firmware-assisted software. And spooling, standard on all models, keeps the peripherals working at top speed.

Our system has virtual memory, giving you the flexibility to run large programs with a relatively small real memory. And with batch plus terminal capability, you can develop programs at a terminal using our interactive EDITOR—then run them unchanged in batch mode for production work.

The HP 3000 is fluent in COBOL, RPG, FORTRAN, BASIC, APL and SPL (our ALGOL-like Systems Programming Language). These are high-level languages, which the operating system treats alike. The same simple control language statements let you use any programming language.

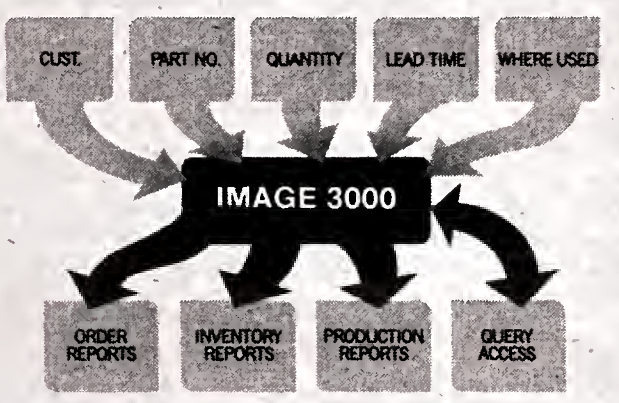
Data Base Management: another "big computer" advantage.

IMAGE/3000, our DBM software package for this system, gives you the means to create and manage a data base. And our simple English-like inquiry language, QUERY, lets you access your data base easily.

You can compile reports, make casual inquiries without writing programs and update data on-line. You can generate forms, titles, page and column headings, data sorted by categories, subtotals, totals and averages.

IMAGE has proved to be such a useful DBM capability that it was named to the 1976 Datapro Software Honor Roll. This places it among the 38 top software products, and one of only three DBM packages, among 1447 rated by computer system users throughout the country.

The software was judged in six categories: ease of installation, throughput efficiency, vendor support, ease of use, documentation and overall satisfaction.



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We've made our data management capability even more useful with the addition of KSAM (Keyed Sequential Access Method), giving you fast access to indexed sequential files.

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HP's "fault control memory" keeps the CPU running at full speed, even when a memory circuit has failed. Five error-correcting bits in every 21-bit word determine where a fault has occurred and the system compensates for it. A RAM automatically stores the information about the faulty chips. When our Customer Engineer arrives for regular maintenance, he calls up a status report and replaces any faulty circuits—even though everything has been running fine as far as you're concerned.

Fast (350 ns access) semiconductor memory is used, making the CPU easy to expand. In fact, you can go from 128K bytes of mainframe memory to 512K bytes, depending on the system you choose. And disc capacity ranges from 15 to 400 megabytes.

At the heart of the CPU is a microprogrammed 32-bit ROM-based processor. It contains 209 firmware instructions that execute many system operations normally left to software. This microprogramming speeds up such recurring operations as moving character strings from one location to another, scanning strings for a particular character and environment switching. Processing interrupts and linked list searches are also implemented in microcode, relieving the operating software of considerable overhead burden.

With its power and versatility, the HP 3000 is a natural upgrade for companies outgrowing their small business computers. If you'd like to see it in action, call your nearest Hewlett-Packard office listed in the White Pages. Or write to Bill Krause, Hewlett-Packard, 11000 Wolfe Road, Cupertino CA 95014.

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With a throughput two to six times greater than the original HP 3000, the Series II is designed to handle batch operations and multi-terminal on-line computation simultaneously.

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The smallest system, the Model 6, has a 128K main memory (expandable to 256K), plus a 50 megabyte moving-head disc, a 1600-bpi magnetic tape unit, an HP 2640B CRT terminal and a 16-port asynchronous terminal controller.

The Model 8 has all of this but starts at 320K bytes of main memory (expandable to 512K).

Any configuration can be enhanced with the addition of line printers, card readers and punches, terminals, discs, tapes and more main memory. Everything is planned to let your system grow with you.

I/O processors usually come only on big computers. The HP 3000 has one.

Stack-oriented architecture improves throughput, reduces program size and enables rapid context switching.

Four printers offer speeds from 200 to 1250 LPM.

We offer a variety of interactive, time-share terminals to match your particular needs.

47701 HPG 2

A DBMS Alternative — Part 2

Despite Drawbacks, Back-End Unit Proves Effective

Last week, in the first half of this two-part series, Goodridge discussed the makeup of a back-end data base management system.

By James Goodridge

Special to Computerworld

Besides the advantages of enhanced performance, reduced memory needs, smaller equipment costs and easier data base recovery that a back-end data base management system (DBMS) offers, there are two others: security and data sharing.

Data base security can be built into the back-end system at several levels:

- The data base administrator responsible for back-end processing can limit access to data base application programs residing in the host.
- The DBMS interface routine in the host can determine which programs may request data base services of the back-end processor.
- The message system in the host can examine each message sent to the backend to ensure it is a standard DBMS service request.
- The data description (subschema) tables in the backend can govern all data retrieval and update operations involving the user's data base to determine that only authorized data is returned to the application program.

There are several data-sharing advantages provided by the back-end approach:

- Elimination of data redundancy and additional secondary storage devices.
- Reduction in the CPU and elapsed time normally required to transfer data between computers — e.g., physical transfer of disk packs, file transmission over a teleprocessing (TP) network, etc.
- Ability to transfer data between several different host machines by having the back-end system perform character reformatting and translation (e.g., Ascii to Ebcdic); this capability would apply to configurations in which multiple hosts using different coding schemes share a single back-end machine.

Back-End Disadvantages

There are some major disadvantages to the back-end approach. The additional cost of the back-end machine itself can be considered a disadvantage.

A second disadvantage is that an organization may have made a large investment in disk drives and disk controllers that are not compatible with the back-end process. This may necessitate the purchase of additional, back-end-compatible peripherals from minicomputer manufacturers or peripheral interfaces from independent vendors.

Reader Commentary

The host and back-end processors may be separated by such a distance that a channel-to-channel adapter between the two machines is infeasible. A TP line connection may then be substituted, but the much lower TP line speeds would severely degrade response times. In addition, TP line charges may be significant.

Since the host/back-end configuration requires hardware from multiple vendors, the danger of circular fingerpointing by the vendors in case of failure must be considered.

And the fact that more hardware is required in this arrangement increases the probability that some component will fail.

If the host processor uses a different character set from that of the back end, then data conversion is required for every transmission between the two machines. The CPU time required to perform this translation may become significant.

The introduction of the host/back-end message system — the intercomputer communications system (ICCS) — requires reliable communications hardware and offsets some of the host CPU main memory savings.

Finally, the introduction of a new hardware/software architecture for data base management will require the data base adminstration staff to develop some new and special skills, such as the ability to control and tune the inter-CPU communications system.

Weighing the relative advantages and disadvantages, Cullinane Corp. has concluded the advantages far outweight the disadvantages and, consequently, has proceeded with the development of a prototype back-end DBMS.

Back-End Implementation

Cullinane Corp. is currently under contract to develop a prototype back-end DBMS. This prototype, to be released this month, employs an IBM 370/158 as the host linked to a Digital Equipment Corp. PDP-11/70 minicomputer serving as the back-end processor.

The 370 uses Cullinane's Integrated Data Base Management System (IDMS) to intercept data base requests and pass them to the message system for transfer to the back-end.

The back-end PDP-11/70 uses IDMS-11, an exact copy of IDMS developed specifically for minicomputers, to perform all data base processing and transfer data to the message system for return to the user's host-resident application.

The 370 employs an OS/VS operating system and is equipped with an IBM 3705 transmission control unit. The prototype back-end Digital Equipment Corp. PDP-11/70 uses the IAS operating system and is attached to a DQ11 synchronous data interface. Transfer of data between the host and backend occurs in half-duplex mode, using bisynchronous line protocol at 2,400 bit/sec.

The back-end DBMS uses all the existing facilities of IDMS and provides the following advantages:

- Reduction in host main memory. Since the back-end machine validates all data base requests and performs all data base I/O, a substantial savings in host main storage requirements may be realized. For example, the user may save up to 40K in main memory by off-loading the following data base modules to the back-end processor:
  - The Central Access Monitor Program, which permits multiple, concurrent programs to use a single copy of DBMS.
  - The Data Base Manager module that actually performs all data base services: data storage, manipulation and retrieval.
  - Device-Media Control Language, which supports runtime tables used to control those portions of the data base that are on-line.

An additional 8K per host application program may be saved as a result of off-loading the data base description tables (subschemas) and the reduction in size of the interface routine required by each program.

- Price/performance. By freeing up host main memory and CPU cycles, throughput may be increased substantially. For example, consider an application that uses 75% of the available host CPU cycles.

Of those cycles, 25% require DBMS services, indicating that only 50% of the host CPU cycles are being used, while the remaining 25% engage back-end processor cycles. By adopting a multiprogramming approach, a second application program with the same CPU usage characteristics could be run concurrently.

This would mean the unused 50% of the host CPU cycles would be devoted to the second application. Thus, multiprogramming in the host/back-end environment would increase host CPU utilization from 50% to nearly 100%.

- Data base recovery. Both the host and back-end processors have available all the standard IDMS utility programs for on-line data base backup and recovery. These utilities include data base dump and restore, automatic journaling of data base modifications, journal rollforward and rollback, data base initialize, fast load, restructuring and display.
- Data base security. Again, both processors have at their disposal the IDMS privacy and security facilities, including preregistration of programs, Data Directory statistics, Data Manipulation Language and subschema privacy locks, data segmentation, data base procedures, data compression and other features that ensure logical and physical data base integrity.
- Data sharing. IDMS provides the back-end user with complete data program independence, permitting the application to draw upon an integrated "global" data base as defined in the schema and yet remain insulated from changes that occur outside its particular subschema view. This schema-subschema arrangement allows complete data privacy as well as data sharing and reduces data redundancy.

Finally, the prototype includes a model ICCS that provides synchronization between tasks and processors, a message exchange system between host and back-end tasks through which data and control information are passed and buffer management in both the host and back-end processors.

The communications system also provides a host/back-end interface that remains totally transparent to the user; consequently, the programmer need not be concerned whether the host or back-end machine is servicing his program's data base requests since the application coding is exactly the same for both processors.

Also, a modular, hierarchical interface allows the ICCS to remain independent of communications hardware and protocol.

Cullinane has concluded that, despite various disadvantages, the prototype back-end DBMS provides a potentially effective alternative for both high-volume, centralized data base environments and distributed processing networks.

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Package Protects User Secrets

CAMBRIDGE, Mass. — Fortress from Odyssey Systems, Inc. is described by the vendor as the first file protection package for IBM 360/370 users that prevents unauthorized file access by computer operations personnel.

Its target users are those who buy time from IBM-based installations.

Fortress is said to protect source, object and load modules as well as data files. The package manages encoding/decoding of modules and files under its control.

By disabling IBM's Indexed Sequential Access Method (Isam) or Basic Partition Access Method (Bpam) "and an important component of the actual data set," Fortress prevents access even by systems programmers, the spokesman claimed.

The encryption method used conforms to standards for data protection recently released by the National Bureau of Standards, he added.

Use of Fortress costs between 3- and 5 cents per encoding/decoding, based on typical current charges for time on remote computing services, Odyssey estimated.

Large files are as cheap to protect as small ones and the protection is so effective users can put sensitive files on public disks, possibly saving disk pack mounting and rental charges, the spokesman claimed.

No software supplied by IBM is replaced or modified by Fortress, he noted. Fortress object code with documentation costs $975.

The firm is located at 4 Brattle St. #306, Cambridge, Mass. 02138.

'SL/1' Designs, Builds Systems

SPRINGFIELD, Va. — The processor that forms the heart of Systems Language/1 (SL/1) automates the design, programming and documentation of complete computer-based application systems, according to the developer, Thorne Data Processing, Inc. (TDP).

SL/1 is not a programming language; it is a means used to specify the data elements of each external input and output for an entire application, a spokesman indicated.

The user may optionally specify the format of the system master files or leave the design of all required file structures to the SL/1 algorithms. The only other information that must be specified, the spokesman said, is a description of the computer configuration to be used.

With that information, SL/1 designs the entire system and determines what programs, including sorts, are required, he explained. It also designs the work files needed between programs.

The processor designs the logic of each program and generates Cobol source code ready for immediate compilation. It also creates all Job Control Language statements needed for both compilation and execution of the system.

The system put together by SL/1 is ready for immediate compilation and execution, the company said.

The package also documents the system it creates with a systems flowchart, system and program narrative, records layouts and an element dictionary, the spokesman added.

SL/1 was written in Assembler and Cobol for use on IBM 360/370 under DOS, OS and VS.

SL/1 costs $60,000. Lease plans at $2,100/mo for 36 months are also available, TDP said from offices in the Tower Bldg., 6320 Augusta Drive, Springfield, Va. 22150.

Option for 'Panda' Checks Use of Vsam

OAK BROOK, Ill.—Panda, the disk analysis and DASD management system from Pansophic Systems, Inc., has been enhanced with an add-on option that reports on Vsam data areas.

The Panda/Vsam option provides Vsam catalog analysis, according to the vendor.

The option's data space report lists all data spaces controlled by a catalog and lists data sets or extents within each data space.

This report also lists tracks available, tracks used, tracks allocated and percent of utilization, Pansophic said.

A second report is a detailed listing of all Vsam data elements and their catalog associations.

Included for each element is password information, creation/expiration dates, all relative byte information, control interval/area statistics and which options are used with the elements, the spokesman added.

Panda runs under OS and OS/VS and costs $5,000. The Panda/Vsam option costs an additional $6,000, Pansophic said from 709 Enterprise Drive, Oak Brook, Ill. 60521.

Upgrade of VS Sort/Merge Also Runs Under MFT, MVT

WHITE PLAINS, N.Y.—Release 3 of IBM's OS/VS Sort/Merge 5740-SM1 provides additional features and improved performance over Release 2 while remaining compatible and retaining the functional capabilities of the earlier release, according to IBM.

Originally intended strictly for the VS environment, this release has been adapted so that execution is also possible in a 370 environment under OS/MFT or MVT.

This is a surprise to some observers in view of IBM's already announced plans to drop support for the non-VS operating systems later this year.

Within the sort/merge itself, intermediate direct-access I/O handling has been changed, reducing CPU time, elapsed time and I/O resource consumption. Release 3 also provides support for mixed device types (including 3340 and 3350) for direct-access work files, the company said.

Automatic secondary allocation of space and release of unused space for direct-access work files—without the user having to specify anything in the Job Control Language—is another feature in the update, a spokesman noted: So is a capability to sort records longer than the device track capacity.

Release 3 also provides the possibility of reading sort control statements when 5740-SM1 is dynamically invoked and thus overriding any information compiled with the invoking program, he added.

Further, the update is said to include increased sorting technique transparency, "greatly improving ease of use for applications with variable length records or user exits," and to have improved installation options and procedures.

Release 3 was designed to operate on IBM 370s under OS/VS1, OS/VS2—both SVS, MVS and VM/370, as well as under OS/-MFT and MVT.

For program support purposes, OS/VS Sort/Merge Release 2 Modification 1 will be considered current until three months after the availability of Release 3.

The updated utility carries a monthly license fee of $181. The programming service classification is A and the preinstallation trial period is one month, he said.

IBM's Isam, Vsam Seen Replaced By Higher Performance 'Iosys'

MILL VALLEY, Calif.—The I/O System (Iosys) is a keyed and sequential access method for IBM 360/370 sites which the vendor, Jeffrey L. Walker & Co., describes as a functional replacement with significantly improved performance for IBM's Isam and Vsam.

Iosys supports variable length records, creates and maintains indexes automatically, avoids "overflow" problems during addition of records and allows for physical deletion of records with released space made available for reuse, a spokesman explained.

There is no requirement for reorganization of data sets, he noted.

Current users indicate a 50% (or better) performance improvement over Isam with no throughput degradation caused by heavy file use, the company claimed. Vsam sites are averaging a 25% performance improvement, the spokesman added.

Iosys files are accessed through CALLs; files may be dynamically created or deleted under program control.

With this support, application programs do not require I/O file descriptions or Job Control Language coding, he said.

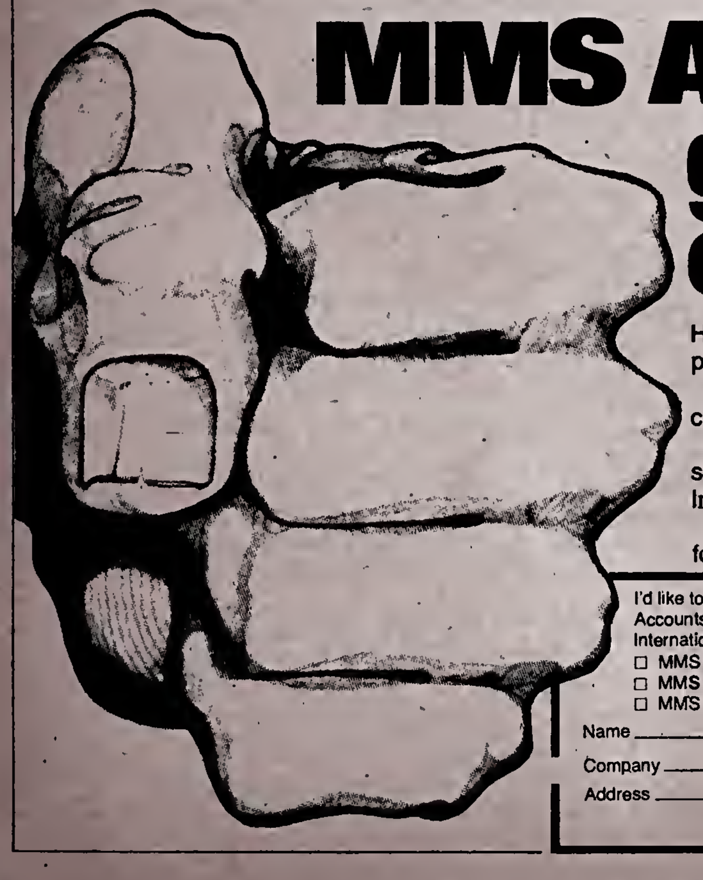
Iosys is delivered with a utility program to add, delete, backup/restore and print files or individual records. In addition to its standard features, Iosys has a compression capability which provides a 30% to 75% reduction in the size of the stored data.

A file protection feature for simultaneous record updating from multiple partitions and an on-line capability (currently for IBM's CICS and GBA International's Swift) are also among the optional features.

The basic package costs $5,000 with the user's choice of features provided for $1,000/each. Jeffrey L. Walker & Co. is located at 655 Redwood Highway, Mill Valley, Calif. 94941.

Correction

Wednesday, April 20, should have been shown as the date for the initial meeting of the North East Computer Measurement Group [CW, Apr. 4].



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System Sluggishness Solved?

SUNNYVALE, Calif. — Resolve II is a "drastically revised and enhanced" version of the Resolve product which Boole & Babbage, Inc. (B&B) introduced last year to monitor, diagnose and solve problems that cause sluggish performance and lost productivity.

Resolve II provides more than 40 action or solution services that focus on six basic problem areas. It manages, for example, real-time problems causing system failures or sluggish performance.

On a more positive note, it works to ensure that system resources are distributed to critical work areas and to cope with problems of job management, direct-access space management and operator efficiency, a spokesman noted.

But Resolve II also supports the need for operator warning messages that would signal developing problems in time to solve them, the ability for users to create their own service routines for problems unique to their installation; and full password security and the ability to log and track critical system data at user specified intervals, B&B said.

Some of the revisions in the package were made to meet OS/MVS problems, the spokesman said. The original Resolve service that changed priorities to direct system resources to critical jobs, for example, was sufficient in MFT through SVS settings, but in MVS, the user has to manage swapability as well.

Resolve II lets the user do this with OKSWAP and DONTSWAP services, he said, adding there are now seven Resolve services unique to MVS.

Users can rent Resolve II for $200- to $675/mo; purchase prices range from $4,000 to $10,000, the company said from 850 Stewart Drive, Sunnyvale, Calif. 94086.

File Copying, Report Writing Included in 'Dumper' Upgrade

GLENVIEW, Ill.— The Dumper from Joseph R. Blank is a parameter-driven utility for IBM OS sites, providing them with a simple means of data examination, file copying and report generation, according to the developer.

Keyword parameters are said to allow selection of specific records in sequential mode and, for indexed sequential and direct-access files, in a random mode as well. Users may limit dumping to specific areas of a file or specific records within the file, Blank added.

Other parameters allow for replacement of data or deletion of records within a file, or for the accumulation of data from fields within a group of records or an entire file and the printing of the accumulated totals.

The accumulation/report capability is useful in both testing and production environments, the vendor said, noting that since the utility can work down to the bit and byte level, bugs can be isolated quite easily.

For ease in reference in a testing environment, all printed output contains the date, time, name of the data set being printed and page number relative to the start of the particular data set, Blank said.

The package's selection facilities can be used for generation of test data or to repair files that contain contaminated data, he added.

Dumper is written in the logical I/O control section of OS to ease the transition from one release to another. It functions under both MFT and MVT environments as well as under PCP.

Version 4.0 of Dumper costs $2,250 and is available now from Joseph R. Blank, 2821 Covert Road, Glenview, Ill. 60025.

Package Produces Structure Charts

PLACENTIA, Calif. — IBM 360/370 users can gain insight into the relationships between the subroutines of a Cobol, Fortran or PL/I system through the output of the Structure Charter package from Pacer Industries, according to a spokeswoman.

After analyzing the user's source code, the package generates a structure chart which shows which subroutines are in the program and how they fit together. The chart is produced on a line printer and visually pinpoints every routine in the program, she said.

A subroutine cross-reference list shows where each subroutine and external variable is used in the structure. A programmer can, therefore, see the effect of a proposed program change and prepare for any problems, she added.

A program hierarchy list shows higher level routines that use each subroutine regardless of how much higher they are in the structure. An alphabetical list of subroutines and variables simplifies the assignment of new names, she said.

Each version of the package — Cobol, Fortran or PL/I — costs $490.

The company can be reached through P.O. Box 1194, Kraemer Blvd., Placentia, Calif. 92670.

Power Control Software Available for IBM Series/1

ATLANTA — IBM has announced its first application software for the Series/1 minicomputer.

The Facility Control/Power Management (FC/PM) package is described as an expanded energy management system similar to the IBM System 7 Power Management software previously available.

This software consists of a pair of Series/1 programs and an optional feature for such functions as power monitoring and management and alarm monitoring and reporting, according to a spokesman.

FC/PM was designed for use in offices, factories, schools, stores and warehouses where multiple installations are required, IBM said.

Typical users of FC/PM will be spending $5,000 or more each month on power bills; the System 7 users typically would have bills three times as large, the spokesman noted.

The first of the FC/PM programs is available now for a monthly license charge of $130. The second program and its optional feature will be available in June for monthly license charges of from $188 to $240.

All monthly license charges are waived after 48 consecutive monthly payments.

NOW PORTA-VERTER CAN TALK DIRECTLY INTO YOUR SYSTEM 3

Comtec's Porta-verter can make remote data entries direct to your IBM System 3 computer via a terminal adapter. This adapter, now offered by Comtec, takes the Porta-verter's signal and adapts it for entry into the System 3. Porta-verter is the data gathering device that collects information wherever your business generates it. Then gets it direct to your computer via conventional telephone lines.

Porta-verter is as easy to handle as a calculator. Everything you enter is visible on paper tape and is simultaneously recorded on magnetic tape cartridge. To transmit, just hook up Porta-verter to a telephone. The built-in modem and acoustic coupler will transmit data to your computer at 1200 baud. Porta-verter. Data entry to System 3 via direct read-in or conventional telephone lines.

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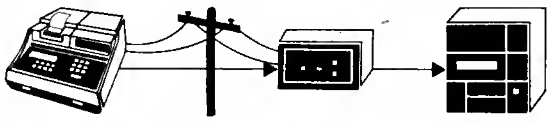

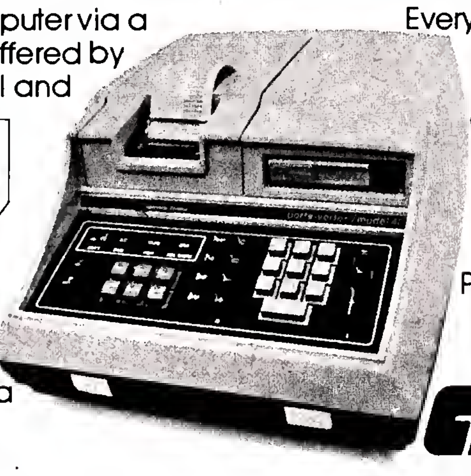

The VS memory diet plan.

Everyone seems to be moving toward using VS because it's so big and powerful.

It also has a giant appetite.

It often eats up a lot of CPU and memory. That can lead to sluggish performance and reduced throughput.

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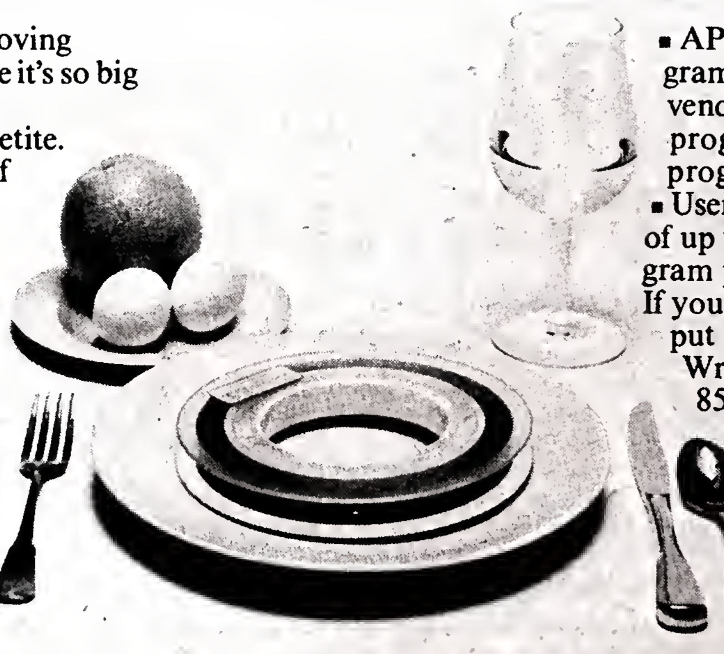

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Say users in Datapro study

Cullinane Corporation's IDMS has been named by Datapro Research Corp. to its 1976 Honor Roll. IDMS led all other database management systems in the fourth annual survey of proprietary software users, who compared survey results for all database management systems based on seven key categories. For all systems measured, IDMS earned the highest rating in five of the seven categories. For systems operational on IBM equipment, IDMS rated highest in six of the seven areas. IDMS was also the only DBMS to improve its ratings in every one of the seven categories when compared to the 1976 survey results.

The chart shows how all Database systems rated.

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Datacom DB, CIM	8	3.3	3.4	3.0	3.4	2.3	3.4	3.1
DBOMP, IBM	48	3.0	2.6	2.4	2.7	2.5	2.7	2.4
DL/1, IBM	29	2.6	2.4	2.3	2.4	2.4	2.5	2.6
DMS-II, Burroughs	5	3.8	4.0	3.6	3.6	2.8	3.0	3.2
GIS, IBM	7	2.4	2.1	2.1	3.0	2.7	2.6	2.3
IDMS, Cullinane	**17**	**3.8**	**3.3**	**3.4**	**3.6**	**3.0**	**3.6**	**3.5**
IMAGE, Hewlett-Packard	11	3.6	3.3	3.7	3.2	2.8	2.9	2.7
IMS, IBM	33	2.9	2.4	2.2	2.5	2.8	2.8	2.9
INQUIRE, Infodata	6	3.2	2.2	2.7	3.0	2.5	2.8	2.6
Model 204, C.C.A.	3	3.7	3.3	3.3	3.3	2.7	3.3	2.7
SYSTEM 2000, MRI Systems	21	3.0	2.3	2.9	3.5	2.4	2.7	2.1
TOTAL, Cincom Systems	113	3.5	3.1	3.4	3.4	2.8	3.0	2.8

**All weighted averages are based on a scale of 4.0 for Excellent.*
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Techniques, Technology Blended to Support Retailers

By David A. Souerwine
Special to Computerworld

A computer system dealing with retailers' inventories can benefit both the manufacturer and the retailer. In developing such a system, however, several key questions must be addressed.

For example, how much of a product should a retailer carry? Can he minimize his capital investment in inventory by carrying a predetermined "optimal" inventory? Can the manufacturer increase the sales of a product line by suggesting an efficient inventory mix of products to its accounts?

These and similar questions on point-of-sale inventory have recently been answered by an innovative "inventory efficiency" system implemented by a Fortune 500 manufacturing company in upstate New York. The system involves several known management science concepts in a unique combination to solve the problems of retailers' inventories.

'Optimal' Inventory Mix

The system provides retailers with an "optimal" inventory mix. In this sense, "optimal" means an inventory which yields the least possible number of out-of-stock items for a given volume of product sold per time period.

All optimal mixes are based on the retailer's personal selling history and his individual bias toward particular products.

The benefits of this system to the retailer can be:

- To minimize capital investment in inventory.
- To maximize the number of inventory turns.
- To reduce the number of stockouts, thus saving time by eliminating unnecessary return visits by consumers.
- To obtain the consumer's commitment at the point of highest motivation by having the right product on hand (reduces post-purchase dissonance).
- To minimize space requirements.

Two Types of Data

To produce these desired end results, two types of data were required: individual customer histories and the overall percentages of demand for each individual product.

In this particular application, a customer base of several thousand accounts throughout the U.S. and several hundred individual products were involved. Data collection efforts began in 1974, when a computer-based order entry system was implemented.

The order entry system involves a national communications network implemented so any retailer in the continental U.S. can call toll-free to order any product he desires. Pertinent account data is printed on a CRT terminal as soon as an operator enters the retailer's identification number.

After the order is entered (one line item per product), an invoice is printed and a record of all the transactions is recorded on magnetic tape for further processing. The raw order entry data is translated into a format appropriate for downstream processing on an IBM 370/158 operating under VS1.

It is this tape file that feeds all the major data systems in the company and serves as a basis for most of this system's data requirements.

In designing this inventory system, the company had to establish detailed information on demand patterns by account. Some basic summarization was necessary, since detailed information on each product by account over a 12-month history base implies a data file of about 600 million characters.

Although a data file of this size is not large by some standards, this system was developed in a tape-oriented installation with considerable restrictions on main memory and other basic computing resources.

Product classes were established by grouping products with similar characteristics. Total demand for each product class by month was then saved in a sequential file keyed by retailer identification number.

Ratios of Demand

For the "inventory efficiency" system to become a reality, it was still necessary to gather demand information by individual product. Using national unit demand, the ratios of demand for each product to total product class demand were calculated.

This process yielded one set of demand ratios which summed to 1.00 for each product class. In effect, a "discrete probability density function" for each product class was established.

Each month the new ratios and already existing data are combined using a smoothing technique to yield the best estimate possible of current product demand.

The statistical Poisson distribution was used to provide the probabilities of each product, with a known percentage of demand, being demanded a given number of times from a retailer, based on a projection of his selling volume per week.

An individual retailer's demand history was combined with the total demand for each of the product classes to establish the ratios of demand for each product class to total product demand. Multiplying each product class density function by its corresponding total product demand density function value yielded one large discrete density function for all products sold.

A projection of the selling rate per week was derived by forecasting an individual retailer's history (linear regression).

By employing the exponential statistical distribution, the company obtained the probabilities of needing one or more of each product during a week at a volume greater than or equal to 0 and less than or equal to the projected volume of total product per week.

Searching all the probability values calculated in this manner, the company selects as the first product in inventory that product with the greatest probability of being demanded. With zero product in inventory, the expected number of shortages is equal to the total demand.

After generating a product into inventory, the expected number of shortages is reduced by the probability of the demand for that product exceeding the current number of those items in inventory. After each inventory addition, the total inventory efficiency is calculated.

In this sense, "efficiency" is the percentage of demand expected to be met at the forecasted selling volume per week.

A new probability value for a product just added to inventory is calculated representing the chance that demand for the product will exceed the current number of units in inventory.

The greater the volume per week, the greater the number of that product is necessary in inventory to reach a given efficiency. Likewise, the actual mix of product may change with volume.

By assigning "costs" to additional inventory units and stockouts, the most profitable mix may be generated.

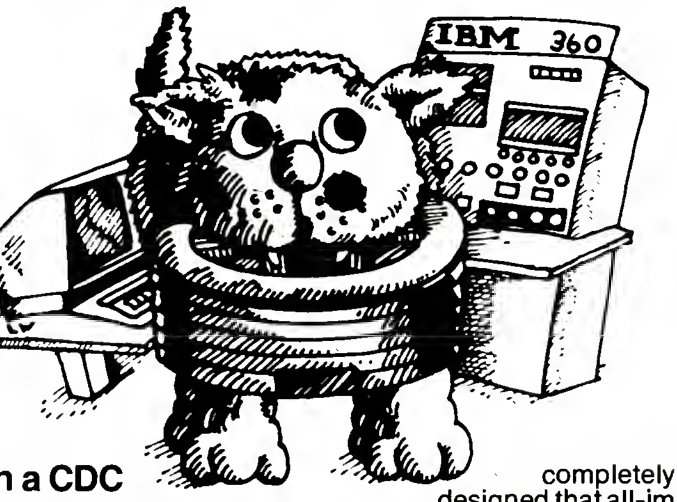
Exciting Implication

Perhaps the most exciting result of this inventory system is the implication it provides for other applications. As long as the probability of requiring any given item appropriate to the application can be derived, the concepts of the model could be employed to reach a solution.

It can also be noted that this model is not heuristic — that is, the solution generated is singularly optimal.

The constructs of the model could be particularly useful in applications involving increasing costs in direct relation to volume and/or weight. For example, if a firm was designing a case to hold spare parts for its service engineers in field locations, a modification of this model could be used to provide the best possible mix of parts.

Souerwine is a senior systems analyst for the Bausch & Lomb Soflens Division in Rochester, N.Y.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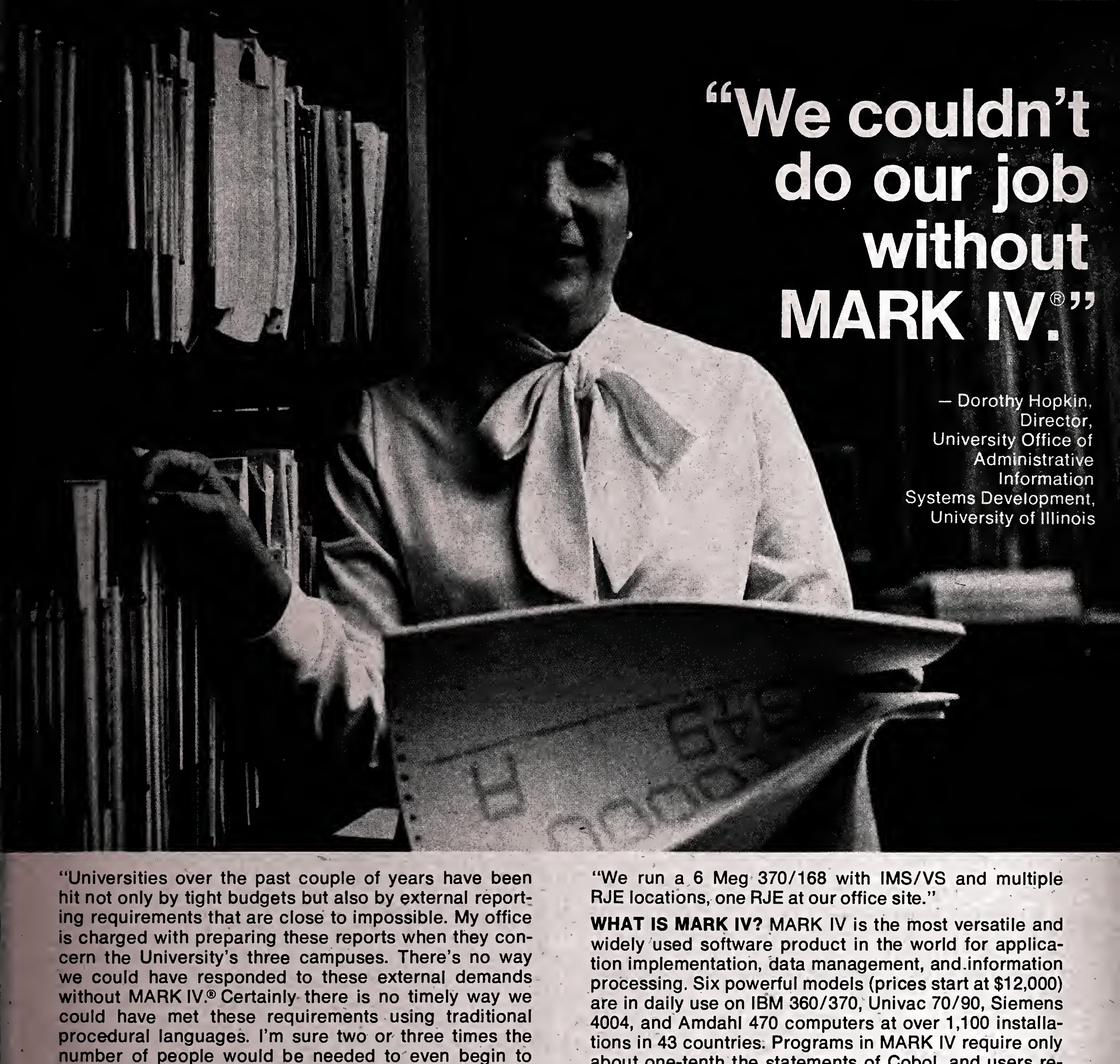
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'Reach' Joins List of Packages Managing Disk Space Under DOS

BURLINGAME, Calif. — The degree to which disk space management is seen as a major problem in many installations is indicated by the introduction last week of still another package designed to cope with the problem. Reach from Software Design, Inc. (SDI) is for DOS and DOS/VS usrs.

The software is said to provide a complete catalog facility, substantial file security and automatic Direct Access Storage Device space allocation. It also has "Contract-at-Close" and "Data File Condense" features which combine to optimize the use of space.

The catalog supported by Reach can include source and object program modules and data sets, a spokesman stated, and any of the things in the catalog are recognized by sequence of creation as well as by what they contain.

The file security includes a facility, for example, which prevents destruction of a still-active data set. Automatic secondary space allocation, without JCL entries, is another Reach feature.

The "Contract-at-Close" feature releases unused disk space when an output file is closed and, again, is comparable to capabilities in other previously available products.

The "Data File Condense," however, physically eliminates deleted records by moving active records into their spaces and ultimately repositions data sets so unused disk space is gathered into a pool rather than being fragmented.

SDI recognized dynamic repositioning of records and data sets might destroy a user's efforts to allay head contentions by placing heavily used files in specific locations. Reach therefore allows the user to override the repositioning action on a disk or data set basis, the vendor noted.

Deliveries of Reach are to begin in late July; cost — starting in the $200/mo range — is dependent upon parts of the modular system selected by the user, SDI said.

SDI is at 880 Mitten Road, Burlingame, Calif. 94010; at Westersingel 16, 3003 Rotterdam, The Netherlands; and at Masons House, Kingsbury Road, London NW9, England.

Cobol on Tandem 16 Planned for Autumn

CUPERTINO, Calif. — Tandem/Cobol, a subset of ANS Cobol 74, will be ready for use on the Tandem 16 Non-Stop Computer System in September, according to a spokesman for Tandem Computers, Inc.

Tandem 16 is a multiprocessor system designed specifically for breakdown-immune, transaction-oriented data base applications.

The system can be repaired or expanded without interruption to computing operations, the spokesman claimed.

This implementation of Cobol utilizes both Tandem's Guardian operating system and Enscribe data base record manager. It is compatible with Tandem T/TAL high-level applications language and with multilanguage environments, he added.

Guardian Features

Among the features of Guardian are nonstop operation; shared, reentrant code; virtual memory allocation; geographical independence of I/O devices; and checkpoint/checkmonitor facilities, he claimed.

Enscribe provides key-sequenced, entry-sequenced and relative file structures; logical file size up to 4 billion bytes; as many as 255 alternate access keys per file; and optional mirror data base recording, he said.

In addition to conventional programming, Tandem/Cobol also provides the capability for defining three-dimensional fixed-length tables of contiguous data and for accessing items relative to their positions in the table.

Either sequential or random access to records in a file is provided through sequential, relative and indexed I/O capabilities of Tandem/Cobol.

The software will carry a one-time $7,000/customer charge plus $500/processor, Tandem said from 20605 Valley Green Drive, Cupertino, Calif. 95014.

Net Adds Service

FAIRFIELD, N.J.— The fiscal data management system (Fiscal/DM) now available on Rapidata, Inc. remote-computing facilities combines the data base facilities of DBMS-10 with the financial reporting facilities of a high-level language, according to a spokeswoman.

It supports hierarchical or network structured data bases and password protection at all levels, as well as automatic consolidations, foreign currency conversion, transaction updating and storage of headings and titles in the data base, she said.

Fiscal models can use simple arithmetic or any of the built-in routines including return on investment, depreciation schedules or forecasting, she added from 20 New Dutch Lane, Fairfield, N.J. 07006.

'Jasper' Users Gain Report Generator

NEW YORK — Datachron Corp. has enhanced the capabilities of its job accounting system — Jasper — with the addition of a report generator subsystem.

The report generator will allow users to design optional job accounting reports according to their own specifications, the firm said. These reports can be used to supplement the performance analysis reports Jasper normally provides.

The user can create 10 variations of the basic report in a single pass. The subsystem also supports complete calculation facilities, including Boolean commands; conditional logic; reports with automatic formatting; headings; subheadings; titles and up to five levels of totals.

The report generator will be included in both the DOS/VS and OS versions of Jasper. The DOS/VS package costs $5,500 and the OS version costs $6,500.

Datachron is at 174 Fifth Ave., New York, N.Y. 10010.

Terminal Support Extended On UCC Scientific Network

DALLAS — University Computing Co. (UCC) has added communications hardware and software support in its Scientific and Engineering Division (SED).

The division's Univac 1108 and Control Data Corp. 6600 network can now be accessed by a wide range of hardware, including IBM 370 and System 3, Digital Equipment Corp., Data General Corp., Burroughs Corp. and most minicomputers.

The expanded Cope Communications Controller service allows IBM 2780 and Hasp multileaving protocols to connect with and run jobs through the 1108 and 6600 equipment, according to the spokesman.

The series complements SED's existing Cope, E1004 and UT 200 protocol support.

The addition of the IBM remote job entry capability extends the 1108 and 6600 services to nearly every type of remote batch terminal and mainframe installation.

UCC will now be able to do business with over 90% of the remote batch terminals in the marketplace, a spokesman stated.

UCC's SED is headquartered at 1930 Hiline Drive, Dallas, Texas 75207.

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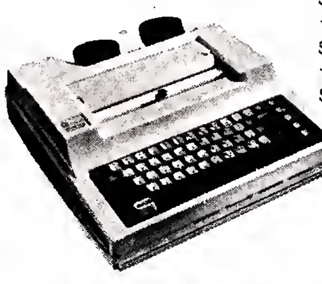

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All-Cobol Package for Payables Has Ties to Purchasing, Ledger

SANTA CLARA, Calif. — An all-Cobol accounts payable package from Data Design Associates has an automatic tie-in with purchasing; it can verify that a purchase order was issued and the goods were received before it accepts an invoice for payment, a spokesman explained.

The package will also match invoice price to ordered price and calculate variance and reject invoices with variances outside of specified limits. Discounts and optimum payment dates are also calculated, the spokesman added.

An extensive interface to general ledger is included, he claimed. This accounts for payables, checks paid, price variance, goods in transit and goods received but not invoiced, the company said.

Report writers, which allow the user to control the content, frequency and sequence of printed output, help reduce audit and research time, the spokesman continued.

The system was designed to operate in medium- and large-sized organizations and will accommodate multiple separate companies or multiple divisions within a single corporation.

The programs are written in a "very clean" Cobol so they should be easily transferrable to other equipment, the company believes, even though they have only been implemented on IBM CPUs so far.

The package runs in 64K bytes of main memory and costs $20,000, the spokesman added from Suite 418, 1333 Lawrence Expressway, Santa Clara, Calif. 95051.

Encumbered Funding Controlled by 'Fics'

ATLANTA — The Financial Information and Control System (Fics) from Management Science America, Inc. (MSA), originally developed for use in banks and bank holding companies, has been enhanced for use in governmental units as well, the vendor said.

Fics is composed of four major subsystems: general ledger; budgeting and planning; responsibility reporting; and profitability accounting, including cost accounting and funds evaluation.

The enhancement supports the use of encumbrance accounting which is required by many units working with government funding. With this change, Fics now allows another range of users to adapt the system to its needs, rather than changing its accounting philosophies to fit a system, MSA said.

The change was designed to allow governmental units, hospitals, colleges, universities and school districts to handle budgetary compliance accounting as well as program and management reporting and reporting for federal grants, a spokesman added.

Written in Cobol and implemented on IBM 360/370, Burroughs, Honeywell and NCR mainframes, the package is modular and costs $40,000 to $55,000 depending on modules selected.

MSA is at Suite 1300, 3445 Peachtree Road, N.E., Atlanta, Ga. 30326.

8080 Assembly, Edit Combined in 'TEA'

BLACKSBURG, Va. — The Tychon Editor/Assembler (TEA) software for Intel 8080-type micro-based systems is completely I/O-independent, relying on its own routines or on those already available in a user's system, according to the vendor, Tychon, Inc.

TEA accepts both octal and hexadecimal address and data values throughout the program input; output can be in either of the two numbering schemes, Tychon said. The switch between octal and "hex" output is made at any time using keyboard commands, a spokesman explained.

The editor portion of TEA contains a range of commands including the ability to insert, delete, change and append source statements to the current text buffer in memory. Character string search commands permit the user to locate all references to a particular symbolic address, mnemonic or comment, he added.

A relocator program allows the software to be placed anywhere in the 8080's memory. Since the editor and assembler are coresident, there is no need to keep reading them from outside storage, the vendor noted.

The TEA software is available in two versins. The standard release starts at address 000 000 (hex 00 00) while the special releases start at user-specified addresses.

A jump to a debug or system monitor must be implemented when ordering standard programmable read-only memory (Prom) sets, if this feature is desired.

The program is available on Intel 1702A or 2708 Proms or on paper tape; listings are also available. Prices start at $35 for a paper tape version, including a user's manual.

Tychon can be reached through P.O. Box 242, Blacksburg, Va. 24060.

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AT&T Planning to Introduce Several Services This Year

By Ronald A. Frank
Of the CW Staff

ATLANTA — AT&T is planning to introduce several services later this year, according to Minor Huffman Jr., executive vice-president of the Center for Communications Management in Ramsey, N.J.

An optical fiber test will begin in mid-year for a user in the Chicago area, using "wire" measured in microns, Huffman said at the recent Interface '77 conference here.

Later, AT&T will announce a voice converter for its Digital Dataphone Service (DDS) that will allow users to transmit digitized voice at 9,600 bit/sec, he predicted.

Also, Bell will expand its Transaction Network Service (TNS) to 12 more cities by the end of the year, he said.

The rate structure of TNS, which costs users about one-half cent per message up to 32 char. in length, is very attractive compared with local distribution costs on other services, Huffman said.

The recently filed interim rates for DDS means users will have to pay roughly the same rates as used on the AT&T Multischedule Private-Line (MPL) voice-grade service. Rates at all speeds except 2,400 bit/sec went up, Huffman said.

And when the final tariff is filed in June, it is expected that there will be few changes, he predicted.

The DDS rates had to be raised because the FCC found that they were not high enough to meet the costs for providing the service, he said.

Ralph Dement, manager for corporate planning at Digital Equipment Corp., reviewed the status of the specialized common carriers for the attendees.

Some users are now finding that the special carriers have reached saturation on some of their intercity routes.

In such cases, the specialized carriers usually cooperate with each other to find the needed capacity for the customer, Dement said.

In general, all terrestrial U.S. facilities are becoming crowded and this situation will not change until satellite links come on stream, he said. The new carriers will react to this problem by emphasizing shared and partial use services, he said.

Adding to the speculation about upcoming AT&T services, Dement told attendees that Bell is developing a packet-switched network "somewhere in New Jersey."

The final speaker was Fred King, manager of market development at Satellite Business Systems (SBS), who said current plans call for operation to begin in 1980.

Initial applications will be point-to-multipoint with charges independent of distance. Typical first customers will be large network users who will have 17 to 25 earth stations on their premises around the country, he said.

SBS will provide integrated voice, data and image lines and case studies show that the first applications will include replacement of existing voice and low-speed services; intracompany mail; high-speed CPU-to-CPU data transfers; and teleconferencing.

The latter concept can save users $15,000 to $20,000 from their present travel costs, King predicted.

CW Photo by R. Frank
Minor Huffman Jr.

Fixed-capacity and demand-capacity service will be offered on channels that have 1.5M bit/sec capacity.

The cost of individual 16- to 24-foot earth stations will not be broken out separately since the customer will pay one rate for a complete bundled service, he said.

Data Briefs

Package Lets Sycor Units Transmit to IBM 360, 370

NEW YORK — Computer Dynamics, Inc. (CDI) has developed a telecommunications package that reportedly allows remote Sycor, Inc. terminals to communicate with IBM 360 and 370 CPUs.

Utilizing Btam, the package will run under DOS or OS and will communicate with Sycor Model 350 or Model 440 terminals operating in the unattended mode, the company said.

The package is available for $5,000 from the teleprocessing consultant firm at 10 E. 39th St., New York, N.Y. 10016.

Silent 700 Gets APL Option

HOUSTON — Texas Instruments, Inc. has introduced APL versions of its Silent 700 Model 745 portable and Model 743 keyboard send/receive (KSR) terminals.

The APL option includes a switch-selectable APL/full Ascii keyboard, according to TI.

The APL keyboard option costs $175 and deliveries will begin in September.

The firm can be reached at P.O. Box 1444, M/S 784, Houston, Texas 77001.

Although Diagnostics Lacking

Modem Users Seen Satisfied With Performance

By John P. Hebert
Of the CW Staff

DELRAN, N.J. — A majority of data communications modem users surveyed recently are quite pleased with the overall performance of most vendors' equipment, but said modem diagnostic facilities are only fair to good.

And although more sites still use Bell System data sets than independent vendors' modems, the percentage has dropped 9% from figures released in the same survey conducted last year.

These are some of the results found in a Datapro Research Corp. survey entitled, "All About Modems" — a 48-page report which includes the experiences of 398 U.S. users of 16,851 modems.

Datapro grouped users' ratings of more than 300 different modems into categories of overall performance, diagnostic facilities, hardware reliability and maintenance services.

The responses of excellent to poor were translated into weighted numerical equivalents of 4 to 1 respectively.

In the low operation speed area (up to 2,400 bit/sec), users rated Datapoint Corp., Memorex Corp. and Syntech Corp. modems consistently higher for all four categories than other vendors' devices, with averages of 3.75, 3.75 and 3.45 respectively.

Users of Bell 100, 201 and 202 series data sets (up to 2,400 bit/sec) scored the units at a 3.1 average for all four categories.

These same users were more pleased with the overall performance of the devices, which received a 3.6, 3.4 and 3.5 respectively, according to the survey's results.

The IBM 3872, which operates in the 2,000- to 2,400 bit/sec range, achieved a 3.7 in the overall performance category, but users gave the modem an average score of 3.4 for all categories.

In the high-speed area — from 2,400- to 9,600 bit/sec — modems manufactured by Paradyne Corp.; Codex Corp.; Penril Data Communications, Inc.; Gandalf Data Communications Ltd.; and International Communications Corp. gathered the highest scores overall, with no marks below 3, except for Penril's 2.5 rating for diagnostic facilities and Codex's 2.8 for maintenance service.

Bell users gave their higher speed modems in the 203 series through the 209 series an average score of 3.175 for all modems surveyed, while IBM's 4872, operating at 4,800 bit/sec, was rated consistently lower, receiving an average mark of 2.3.

Datapoint and Intertel, Inc. modems were given perfect scores of 4 for diagnostic facilities.

Paradyne received a 3.7 in this category, while only 10 out of 40 other vendors' modems received marks above the survey average of 2.7, including Codex, ICC, Memorex, Sycor and Gandalf.

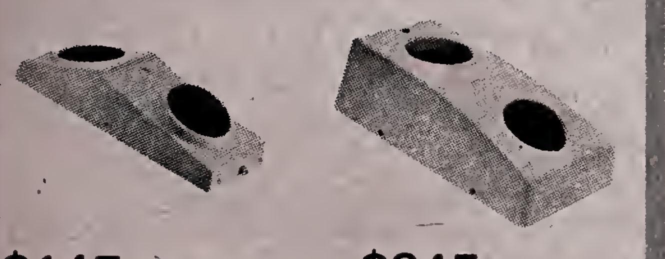
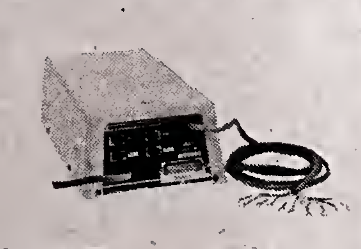
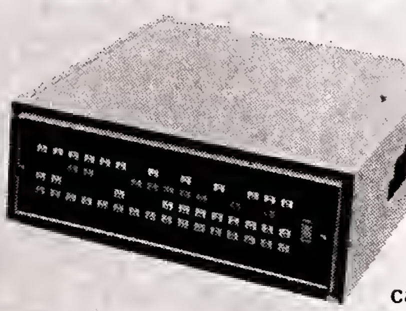
The Bell System was used by 87.1% of all users surveyed. Western Union, MCI Communications Corp. and Southern Pacific Communications Corp. services were used by between 2.2% and 3.7% of users surveyed.

Major dissatisfactions voiced by users in the Datapro report include line quality (35%), diagnostics (25.5%), line outages (24.2%) and transmission errors (15.8%).

The survey also indicated that users employ more Bell modems than any other vendor, with 4,718 or 28% out of the 16,581 total.

This is in contrast to a 1976 Datapro survey of 11,820 modem users which showed Bell had 4,376 modems installed at user sites, giving it 37% of the survey base.

The report is available for $12 from Datapro, which is located at 1805 Underwood Blvd., Delran, N.J. 08075.

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Front-End Network Processor Seen Off-Loading Mainframe Overhead 30%

By John P. Hebert
Of the CW Staff

ATLANTA—The solution to host communications processing overhead is a front-end communications processor, while a marriage between DP and communications can solve network software problems, according to the senior associate of a network research organization.

Communications processors can substantially extend the life of a host processor system, James A. Wood of Richard A. Deal & Associates, Inc. said at a recent conference here.

A front-end net processor can do this and reduce communications costs substantially by eliminating the lion's share of host processing overhead, which can be up to 30%, Wood told conference session attendees.

The host CPU, he said, is designed to handle applications processing. Off-loading communications processing functions will improve the performance of the host as well as improve the flexibility and availability of the DP site, Wood explained.

Basic Function

The basic function of the communications processor is to handle at least one circuit, but the units now also handle terminals. They are involved in multiplexing, they may concentrate data, assume switching functions and act as network front ends, Wood said.

The processors can handle up to 512 channels, "but it is reasonable to assume they can handle 128 channels effectively," he said. The cost of this processing power can range from $15,000 for a small unit to over $2 million for a multiprocessing system, he added.

Statistical multiplexers are significant because they provide savings by conserving bandwidth.

The loading on a circuit with interactive terminals is typically very small—only about 10%—but users can obtain a throughput increase of two to four times with a statistical multiplexer, Wood said.

Its drawback, however, is that it doesn't offer the opportunity to distribute the data processing functions, he noted.

Four Classes

At present, there are four classes of communications processors, according to Wood.

The first two classes include a hard-wired IBM 2701-type and a programmable variation of that type of device. That second class is evolving into a third class of special-purpose, programmable processors that will be available in a short time, as evidenced by the Memorex Corp. Model 1380, he said.

The fourth class is categorized by a minicomputer-based, general-purpose device which is usually implemented in redundant configurations and has a throughput capability in the range of 50 kbit/sec to 1M bit/sec, he said.

Class IV Processors

Class IV processors have unlimited functional capabilities, but they cost up to $2 million, he said, adding the Class III processors "will be the machines to give users a break" in the near future.

Communications software, on the other hand, is available with functional reliability, but there is still a need to marry the DP and communications areas, Wood maintained.

"You can get the integration of network control with system architects — people who can put the network together," he said.

Unit Extends TTY Reach

CLIFTON, N.J. — Universal Technology, Inc. (Utec) has introduced a communications processor which reportedly extends the reach of Telex, TWX, Teletype and other teletypewriters (TTY) to allow access to incompatible networks.

The Utec ML-76 contains its own power supply, plug-in boards and cabinet to handle synchronous and asynchronous I/O conversion, according to a company spokesman.

The converter is primarily intended for international timesharing situations of large users to allow access to incompatible machines on either side of the carrier link, he said.

This makes it possible for users to avoid going through a carrier switching center for conversion and to avoid the necessity of buying an international Telex terminal, the spokesman added.

The basic microprocessor, cabinet and an integrated modem for one I/O line costs $6,000.

Utec is located at 871 Allwood Road, Clifton, N.J. 07012.

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Weighing Future Network Offerings Seen Critical

By John P. Hebert
Of the CW Staff

ATLANTA — Barring the impact of political power plays, users in this country can count on better networking alternatives which should be incorporated into their network plans.

And network planning is becoming an increasingly important discipline, according to speakers at a recent conference here.

There are very large corporations that have public network services based on intelligent concepts "on the drawing board" for entry in the next few years, accoridng to Dr. Dixon Doll, president of DMW Telecommunications Corp.

The possibility of a very bright future in data communications services will depend on the absence of "political power plays" and on the establishment of protocol standards that will make the exchange of information satisfactory and reliable, Doll said.

There will be satellite services available in the next few years that are not available today, he said, alluding to Satellite Business Systems' entry into the carrier scene by 1981 and the advent of network intelligence.

And, in one year's time, AT&T will become a value-added carrier with its Transaction Network Services operation, Doll pointed out.

"When planning a network, it would be realistic to put these predictions into your plan," he said. Even though many of these services may not become available, it would be good to know about them, he added.

"You can't use conventional transmission strategies in the future with packet-swithced nets. The user must now begin to plan for the future to meet the changes because all of the traditional cost factors associated with present networks will change," he said.

For example, the problem of new architectures taking the processing and communications functions away from the central site and into remote locations will have to be faced.

Distributed processing and distributed systems will pose questions different from today's, Doll noted.

If distributed processing takes hold, users will have to decide where they will put their data base files and which transactions can afford to be off-loaded from the CPU, Doll said.

Main Problem

How to control the transaction flow will become the main problem, Doll said.

The flow will be impeded by the lack of good, solid data base management system software and the lack of plans for addressing the problems of file locations and access methods, he explained.

In systems of the future, transaction response times will be improved by arranging for different file paths, he told the group.

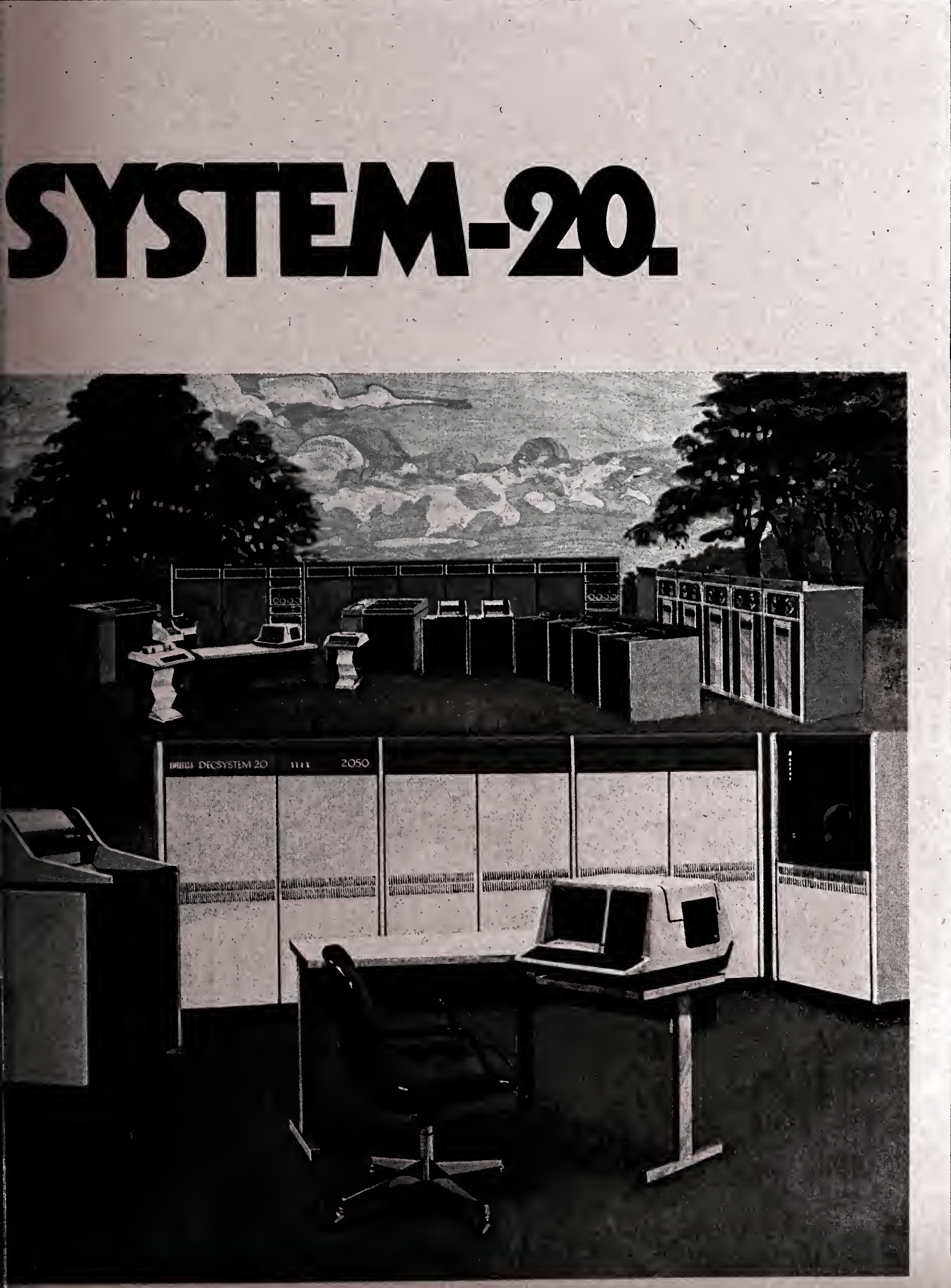
The key to justification of a distributed processing network, he said, is to look at the productivity. First make sure that the ultimate users of the information are satisfied and then be sure the response time is adequate for the terminal operator, Doll said.

According to cospeaker Dr. Howard Frank, president of Network Analysis Corp., people are just beginning to realize the importance of network planning.

Network planning, Frank said, is as much a discipline as business planning in general. If you can define the problem, then you are two-thirds of the way there, Frank told attendees.

The problems involved with network planning are strategical issues. "You must define the problem, then define performance, in addition to defining the constraints imposed on the network," he said.

Office communications is so critical; if the net is down the whole business falls apart, he added.



Infotron Multiplexer Offered for PDP-11s

PENNSAUKEN, N.J. — Infotron Systems Corp. has a 16-line asynchronous multiplexer for use with Digital Equipment Corp.'s PDP-11 computers.

The Infotron PI 510 is functionally equivalent to and software-compatible with DEC's DH11 multiplexer with modem control, according to an Infotron spokesman.

Each of the I/O channels includes nine status indicators, enabling users to determine system status at a glance.

The PI 510 costs $6,745 for the 16 I/O channel configuration.

Various modem interfaces are available for mixed transmission rates to 9,600 bit/sec, Infotron said from 7300 N. Crescent Blvd., Pennsauken, N.J. 08110.

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Terminal Transactions

Music Maker's Search for Integrated System Pays Off

TENAFLY, N.J. — A radio programming firm's five-year search for an inexpensive, intelligent word-processing system with communications capabilities ended last year with a terminal system that combines text editing with storage and communications.

Bonneville Broadcast Consultants, Inc.'s executive vice-president, Loring Fisher, had been looking at word-processing and on-line terminals, but wanted to marry their functions.

"I found I was dealing with a never-never land where you can get one of the functions, but not all three," he recalled.

The company used time-shared computer services for some time; until recently, its I/O device was an IBM magnetic card unit.

This unit was extremely reliable, Fisher said, but its capacity was too limited for Bonneville and also lacked a major capability— text editing and word processing — which Fisher and his associates felt would be necessary as their business expanded.

Bonneville wanted an efficient, economical terminal to communicate with the remote computer plus a high-quality word-processing capability, preferably all in one basic package.

The firm rejected magnetic tapes because of their relatively lower reliability and slower access times and eliminated CRT terminals because of high prices and their lack of efficient word-processing capabilities, Fisher said.

Prototype System

The company's search led it to an Edityper Systems Corp. video word-processing system that combined the functions needed by Bonneville at a systems hardware cost of less than $10,000, according to Fisher.

The prototype installation of the terminal system, he said, is a success story for systems design and effective communications. The same thing could have been done long ago, but it would have cost Bonneville $100,000, he added.

The system consists of a keyboard CRT terminal, a 250K-byte floppy disk storage unit and an IBM Selectric typewriter equipped with an Edityper baseplate for key action conversion to Ascii code.

The terminal is tied to a Bell Dataphone set and a Bell Digital Dataphone Service (DDS) dedicated digital communications line for batch transmission of radio programs to a Digital Equipment Corp. Decsystem-10 CPU at 300 bit/sec, Fisher said.

Control of Music

The company's primary service is music selection, and the system permits automatic control of music scheduled for each individual segment of a taped program.

The system also eases the problem of keeping a tight watch over the company's inventory of music albums, Fisher noted.

Bonneville personnel are continually developing musical program schedules which are issued to subscriber stations on a weekly basis. Bonneville presently gives its subscribers a selection of five program formats. Each program segment is oriented to one of the musical formats.

Once a segment has been completed, information on the selections are keyed into the CRT terminal via the keyboard and displayed on the screen for corrections, additions and final verification.

The approved segment is then stored in the system's floppy disk until a number of segments are accumulated and can be transmitted in a batch to the remote computer,

The time-sharing system notifies the Bonneville office if a particular segment is unusable in its present form and the segment is then adjusted at the terminal and transmitted again to the CPU.

The system then schedules each segment in a specific time slot within an overall program schedule.

These finalized program schedules and program segments are transmitted back to the Edityper, printed out on the Selectric and stored on the floppy disks.

The hard copy serves as the master copy for printed copies. These copies go to the various subscribers, the master copy goes into the central files and the floppy disk is erased, Fisher explained.

Tapes of the program segments are shipped to the parent facilities in Salt Lake City, where all duplicate tapes are produced and sent to the subscribers.

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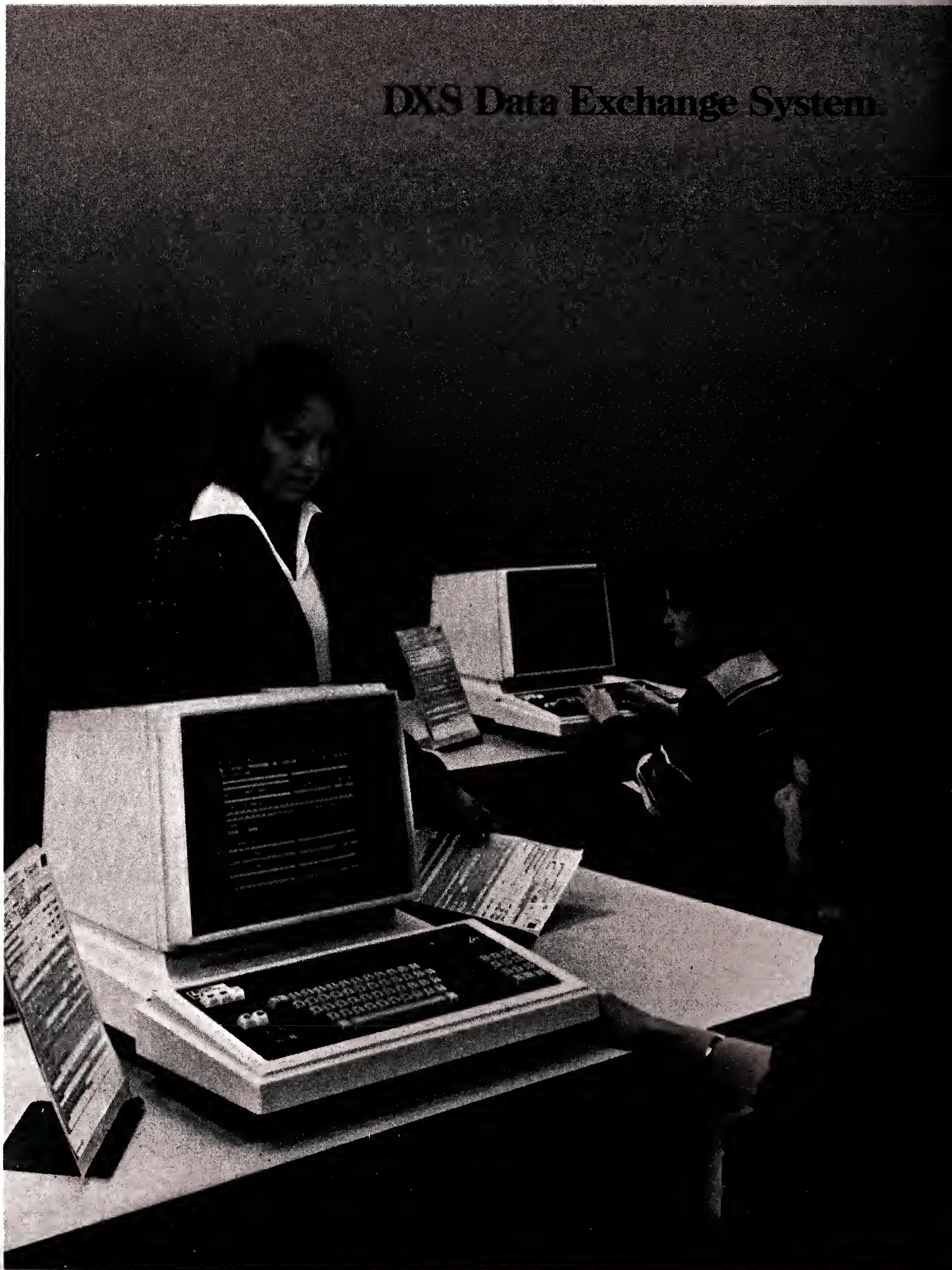

Trendata Extends T/S Line

SUNNYVALE, Calif. — Trendata has added a card reader and a paper tape reader/punch to its line of time-sharing terminals.

The tab card reader reads standard 80-column cards punched in Hollerith code and translates the information to Ascii at 300 bit/sec, Trendata said.

The paper tape reader/punch handles 5-, 6-, 7- or 8-channel Mylar and Mylar-laminated tape and has switch-selectable speeds from 110- to 300 bit/sec,a spokesman added.

The reader/punch is suitable for computer-generated information in numerical control applications, he said.

Both peripherals are table-top units, do not require a controlled environment and can be connected to the company's Series 4000 and Trendwriter terminals, he noted.

The card reader costs $3,900 and the reader/punch is priced at $3,995. Trendata is at 610 Palomar Ave., Sunnyvale, Calif. 94086.

Harris Adds CRTs With Editing Functions To Series 2500 Newspaper Systems

MELBOURNE, Fla. — Harris Corp. has added news copy input terminals featuring basic editing functions to its Series 2500 newspaper copy-processing systems.

The CRT terminal Model 1210 was designed for use in a newsroom or for local input of display advertising copy; the Model 1220 was designed for remote news bureaus.

Each terminal includes a 1K-character screen, an IBM Selectric-type keyboard and a 4K-character memory that can store about 500 words of copy, Harris stated.

Terminal Transactions

Editing functions standard on both models include insert, delete and overstrike characters and delete line.

The Model 1210 local copy terminal has a standard Harris interface and can transmit at 4,800 bit/sec. The 1220 remote terminal has an RS-232C or current-loop interface and transmits asynchronously at speeds up to 1,800 bit/sec, a spokesman noted.

Both terminals allow copy to be stored in memory for later recall using the company's Model 1520 or Model 1700 CRTs, he added.

Other Features

Other features include four-way keyboard cursor control, full-word wraparound and the ability to scroll through 500-word stories, the company stated.

No special interfaces or communications equipment is needed to attach the terminals to the Series 2500 prepress system, Harris said.

The Model 1210 can be located up to 1,000 ft from a Series 2500 processor and costs $2,995. A Model 1220 terminal costs $3,495, with deliveries beginning in June, the spokesman noted.

Model 1210 deliveries will begin in August, he added from Harris at 505 Rodes Blvd., Melbourne, Fla. 32935.

Paper Tape Perforator Runs at 1,200 Bit/Sec

SANTA ANA, Calif. — A tape perforator system capable of 1,200 bit/sec output for communications applications has been introduced by the Remex Division of Ex-Cell-O Corp.

The Remex RQS 6120 perforator/spooler system with RS-232C interface has a 120 char./sec asynchronous bidirectional punch speed, according to the firm.

The transmission rate is selectable to intermediate speeds from 110- to 1,200 bit/sec, Remex said, adding the 6120 can be connected directly to any modem with RS-232C output and can operate online as a data collection device.

In addition to the selectable transmission rates, the communications punch reportedly has selectable character lengths of five, six, seven or eight levels with a six-level advance feed available.

It also comes with stop bit selection between words, odd or even parity selection and parity error inhibit selection, Remex said.

The perforator system is available in rack-mounted and table-top versions. A fanfold version, the RQF 6120, is also offered.

The rack-mounted RQS system costs $3,150; the table-top version is priced at $3,300. Remex is at 1733 Alton St., Santa Ana, Calif. 92705.

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Source: 1976 Auerbach Computer Technology Report

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Burroughs Unveils 'Supercomputer' With Array Design

By Frank Vaughan
Of the CW Staff

DETROIT — Burroughs Corp. has introduced the Burroughs Scientific Processor (BSP), a large-scale system "suited to the largest problem-solving requirements of science, industry and government," according to the firm.

The system is capable of performing numerical computations at speeds up to 50 million floating-point operation/sec, Burroughs claimed. It utilizes charge-coupled device (CCD) circuitry for file memory with a capacity expandable to over 67 million 56-bit words, a spokesman added.

The BSP utilizes multiple processing units operating in parallel, the spokesman said. This arrangement constitutes an array processor architecture that enables the BSP to solve large vector-oriented problems at high speed, he explained, noting vectors are sets of related data elements.

Three Versions

Users of B7800 systems can utilize the basic BSP configuration to add BSP-level scientific processing capabilities to their systems, Burroughs said.

The processor will be available in three models: the basic BSP, the BSP/7811 and the BSP/7821.

The basic BSP includes a control processor with 262k words of memory; a parallel processor with 16 arithmetic elements and 524k words of memory, expandable to 8M words; file memory of 4,194,304 words expandable in equal increments to 67,108,864 words; and an interface adapter that lets the B7800 system function as the system manager.

The BSP/7811 uses the B7811 as a system manager and the BSP/7821 uses the B7821 in a similar manner.

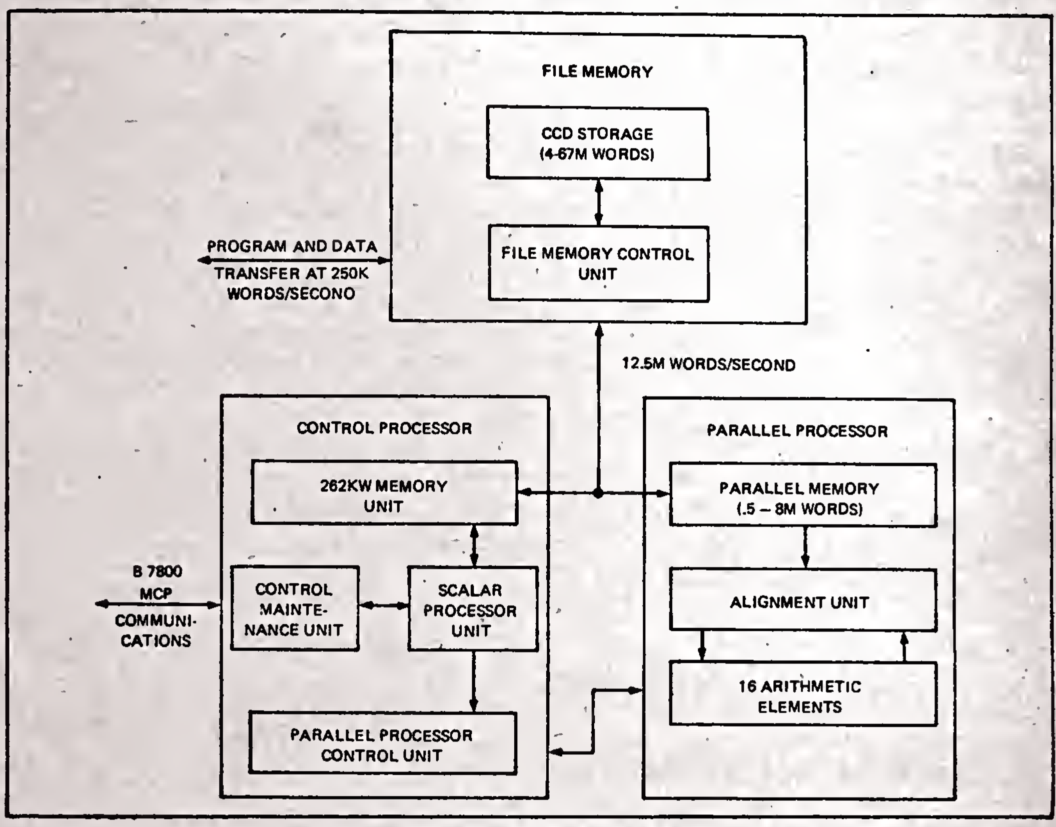
Interface Controls Peripherals

User interface with the total system is provided through the system manager. It controls all peripherals, external data storage subsystems, data communications processors, external data I/O and job-flow scheduling, Burroughs said.

In addition to controlling the scientific processor's resources, the B7800 system manager can simultaneously control on-line terminal networks with large integrated data bases and execute user applications written in Cobol, PL/I, Basic, Algol, Fortran and APL, the spokesman added.

Asynchronous Sections

The BSP is comprised of three asynchronous sections: a control processor, a multielement parallel processor and a file memory, Burroughs said.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ALIGNMENT UNIT
16 ARITHMETIC ELEMENTS

BSP Functional Diagram

The control processor acts as the control information interface with the B7800 system manager, executes certain scalar (single-dimension) statements and manages the other two units. It has its own 262k words of bipolar memory.

The parallel processor executes vector or array program statements through its 16 arithmetic elements and its own 524k words of bipolar memory. The memory can be expanded to over 8 million words, Burroughs said.

The file memory stores programs and data for use by the control processor and parallel processor. It has an access time of 500 microsec and a transfer rate of 75 million byte/sec.

Applications in Fortran

Applications for BSP are programmed in Fortran and compiled using a vectorized Fortran compiler, according to the spokesman. The vectorizing compiler converts frequently used Fortran statements from serial to vector orientation so these instructions can operate in the parallel processing architecture during program execution.

Purchase prices range from approximately $3.8 million to $6.1 million. Lease rates will range from approximately $128,000- to $175,000/mo. Deliveries are expected to start in 1979, Burroughs said.

Puts Data Files On-Line

User Replacing 35,000 Tapes With Video MSS

BOULDER, Colo. — The National Center for Atmospheric Research (NCAR) here is replacing and supplementing over 35,000 magnetic tapes currently in use with a video mass storage system (MSS).

The Ampex Corp. TBM mass storage system, capable of storing over 180 billion bits of digital information, is operating on-line to the center's Control Data Corp. CDC 7600. Plans are being made to allow operation with a Cray-1 mainframe soon to be installed at NCAR, a spokesman said.

The MSS is expected to enhance the data analysis capability of NCAR and university scientists who use the NCAR computing facility, an Ampex spokesman added.

Data File Management

The newly installed MSS will manage a significant portion of the constantly growing data files stored at the NCAR facility. It will replace or supplement the more than 35,000 magnetic tapes presently in use, the NCAR spokesman noted.

During acceptance testing, the MSS was put to work storing a throughput total of more than 380 billion bits of live user data in a 15-day period. During this time, it operated with availability in excess of 95%, he said.

Significant Role

The NCAR scientific computers together with the MSS are expected to play a significant role in storing and analyzing data developed by the Global Atmospheric Research Program (Garp), he said.

Garp is an international research program designed to gain a detailed understanding of the atmosphere's global behavior. One of its goals is to provide a scientific basis for extending the range of weather forecasting to a week or more.

The TBM system uses video recording techniques to store approximately 45 billion bits of user data on a single 10.5-in. reel of standard videotape. Accessing at tape speeds of up to 1,000 in./sec, TBM gives the user typical access times on the order of 15 sec, not including catalogue search times, Ampex said.

Printer/Plotters Now Metric

CLEVELAND — Two models of Gould, Inc.'s 5000 series electrostatic printer/plotters are now available with print heads calibrated for plotting in metric scale units, the vendor said.

The Model 5005M has a recording resolution of 40 stylus/cm, a total of 1,056 styli in a 26.4-cm writing width. It prints at 1,600 line/min with a 64-character set or 8.25 cm/sec in the graphic mode, Gould said.

The Model 5200M has 80 stylus/cm, a total of 2,112 styli in 26.4 cm, and prints at 650 line/min with a 96-character Ascii set or 4.19 cm/sec in the graphic mode.

The paper width for both models is 27.9 cm.

On-line direct memory access interfaces are available for IBM 360/370, Digital Equipment Corp. PDP-11, Data General Corp. Nova and Hewlett-Packard Co. computers.

The Model 5005M costs $8,575 and the Model 5200M costs $10,195 from Gould at 3631 Perkins Ave., Cleveland, Ohio 44114.

BASF Has Lifetime Warranty

BEDFORD, Mass. — BASF Systems, Inc. is offering a "full lifetime warranty" on its Series 1300 data modules, according to a spokesman.

The warranty will be in effect for the entire functional life of the hardware system to which the data module is attached.

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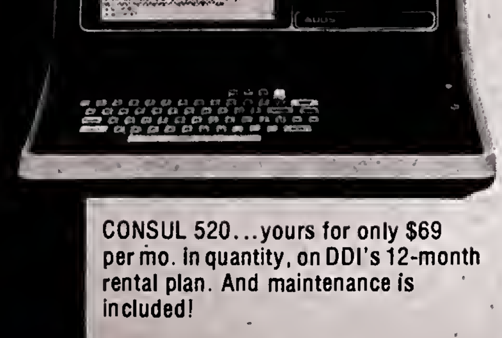

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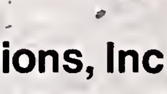

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Keeps Payroll Down

S&L Credits On-Line CPU With Increase in Assets

TOLEDO, Ohio — An on-line system has been credited with helping Peoples Savings Association here increase its assets and expand its offices.

In 1966, when the savings and loan (S&L) institution put an NCR Corp. 315 on-line to teller terminals, it was believed an S&L had to have a minimum of $200 million in assets to justify the system, E.O. Knowles recalled. Knowles, the S&L's chairman and president, noted Peoples' was about four times smaller than that at the time.

But in retrospect, he said, it is apparent the system was needed if the S&L was to experience the growth and efficiency increases necessary to serve its members.

Employee Ratio Smaller

The association has a ratio of .3 employees per $1 million in assets today, compared with over one employee per $1 million in 1960. Had payroll increased at the same rate as assets during the period, Peoples would have over 300 employees today instead of fewer than 100.

"Often when computer systems are installed, management expects to pay off the investment through employee reductions or attrition. That is not the way it works."

"The best way is when you don't add as many employees as you grow. The system will more than pay for itself, but it's usually wasted effort to look for an immediate payoff in the form of employee reductions," he said.

A key role was played by the on-line system in the association's branch expansion. "We have nothing but money at our branches," Knowles said. "All processing, accounting and record-handling are done by the computer at a central location; the teller terminals provide input from the branch offices.

"The system enables us to bring our services closer to our customers without a proportionate increase in overhead costs."

With the S&L's larger size and its plans for further expansion, Peoples recently ordered an NCR Criterion 8550. Knowles has definite plans for the system.

In addition to handling processing for Peoples, the system will do processing for other S&Ls. "In this way, our computer operation will become a profit center in its own right," Knowles said.

The system will also provide additional capacity to handle the continued growth of the association and will accommodate many of the electronic services being implemented in the financial industry.

"Whether we like it or not, the plastic card, statement savings and the self-service financial teller are the future of our business," Knowles said. "Our future expansion will be more in automatic teller machines than in mausoleums of sticks and stones."

Sycor 440 Gets Backup Storage

ANN ARBOR, Mich. — Sycor, Inc. has introduced a cartridge tape drive for its Model 440 distributed data entry and processing terminal system.

The drive reportedly provides up to 5.76M characters of storage backup for distributed processing applications.

The unit uses 3M-type cartridges and has a read/write speed of 60 in./sec with a 3,200 bit/in. recording density. The drive is enclosed in a free-standing cabinet and connected by cable to the 440 terminal, according to a spokesman.

The unit can be field-installed. It costs $91/mo on a one-year lease, including maintenance, or $3,500 to buy. Cartridges cost from $20.

June deliveries are scheduled from Sycor at 100 Phoenix Drive, Ann Arbor, Mich. 48104.

Continuing Increases In Price/Performance Seen for Large User

By Frank Vaughan
Of the CW Staff

TORONTO — End users of large computer systems can look forward to continued improvements in system price/-performance ratios, Dr. Warren Gaines predicted here recently.

Technical achievements in logic circuits, main memories and mass storage will pace the improvements, the director of advanced marketing programs for Honeywell Information Systems, Inc. told the Canadian Information Processing Society.

Denser and faster semiconductors will allow the historic 12% to 15% annual price/-performance improvement to continue into the 1980s, he said. He also predicted similar trends for data storage devices, where rotating magnetic media still have the potential for substantial density increases that should bring a lower cost per stored bit.

"Higher levels of integration and attendant lower costs per gate in logic circuitry are now being combined with new methods of packaging faster semiconductors," Gaines said. "Experience in developing Honeywell's large-scale computer system proved that very fast Current Mode Logic chips, when placed in dense micropackages, can deliver up to 500% speed increases from less than 1/15 the space."

These densities are important as designers work with nanosecond processing speeds, he said, but "equally as dramatic are memory chip trends. The semiconductor industry has been able to develop MOS enhancements to support a 25%-plus improvement per year in the cost/bit for large main memories."

The transition from core memories through various MOS memory sizes to the current 4K-bit chips has been accompanied by a substantial reduction in the physical size of memories by 20 to 1, he said.

"Where core memories required 40 cubic feet for 256K words of memory, 4K technology allows packaging 1 million words in only eight cubic feet," he noted.

The trend continues with some semiconductor manufacturers delivering prototype quantities of 16K-bit chips today. The projections are for 64K- and 128K-bit offerings by the end of this decade, he said.

"By the 1980s, these trends will result in substantial changes in memory use."

"As the price of a 256K-word memory approaches the monthly salary of a programmer, DP managers will be reevaluating the trade-offs between memory use and programming time," he concluded.

An Editing Pet Tha

The perfect editing terminal for transaction processing must be more than a little bit smart. It has to be wise like our OWL-1200. With features that assure high accuracy source data entry, fast data editing, simplified host computer programming, and reduced host computer loading.

Our OWL gives you all the human engineering features you get with our FOX-1100, plus a lot more. And the price is right. Just $1496 in quantities of 25.

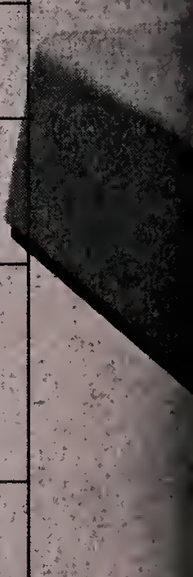
Check the comparison chart of editing terminals to see all the reasons why the OWL-1200 is simply "incomparable."

		PERKIN-ELMER	HAZEL-TINE	LEAR SIEGLER		ADDS
USER REQUIREMENT	FEATURES	OWL-1200	MOD. 1 EDITING	ADM-1A	ADM-2	980
High Operator Data Entry Accuracy	Protected fields	Yes	Yes	Yes	Yes	Yes
	Low-intensity fields	Yes	Yes	Partial	Partial	Partial
	Numeric only fields	Yes	Yes	No	No	No
	Inverse video fields	Yes	Yes	No	No	No
	Blink fields	Yes	Yes	No	Yes	Yes
	Line drawing capability	Yes	No	No	No	Yes
Simple, Fast Editing of Data	Insert/delete character	Yes	Yes	Partial[1]	Yes	Yes
	Insert/delete line	Yes	Yes	Partial[1]	Yes	Yes
Minimized Loading on Host Computer	Host programmable send keys: send all data, send only unprotected data, send only data modified by operator, send only a "request to send" header.	Yes	No	No	No	No
Simplified Programming	Ability of host CPU to read device status	Yes	No	No	No	No
	Ability of host CPU to read device mode key settings and communication option straps	Yes	No	No	No	No
	Program override on mode key settings	Yes	No	No	Yes	No
Simplified Program Debugging	Transparent mode permits all characters to be displayed	Yes	No	No	No	No
Cost Effectiveness	OEM price in quantities of 25*	$1496	$1670	~~$1795~~ * $1595	~~$2395~~ * $2095	$1995

*When unit includes editing capabilities, 24 x 80 display, numeric pad, and upper/lower case characters.

[1] No Key. Requires Two Key Code.

* Just announced price changes



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416-677-8990 Mississauga, Ontario, Canada

Airline Puts Long Lookup Times To Flight With Microfilm System

By Frank Vaughan
Of the CW Staff

LOS ANGELES — Flying Tiger Line, Inc. has reduced its document lookup time by one third and saved $50,000 annually since it implemented a microfilm retrieval system, the all-cargo air carrier reported.

Where the airline formerly had 15 clerks working two shifts, it now handles twice the workload with 11 clerks on one shift.

"We process about 35,000 to 40,000 airbills a month, most of which have many attachments related to special charges, instructions, transfers and the like," according to Bruce Brandenburg, manager of cargo accounting systems.

About one-third of all new airbill files are referenced each month to answer customer, supplier or internal inquiries.

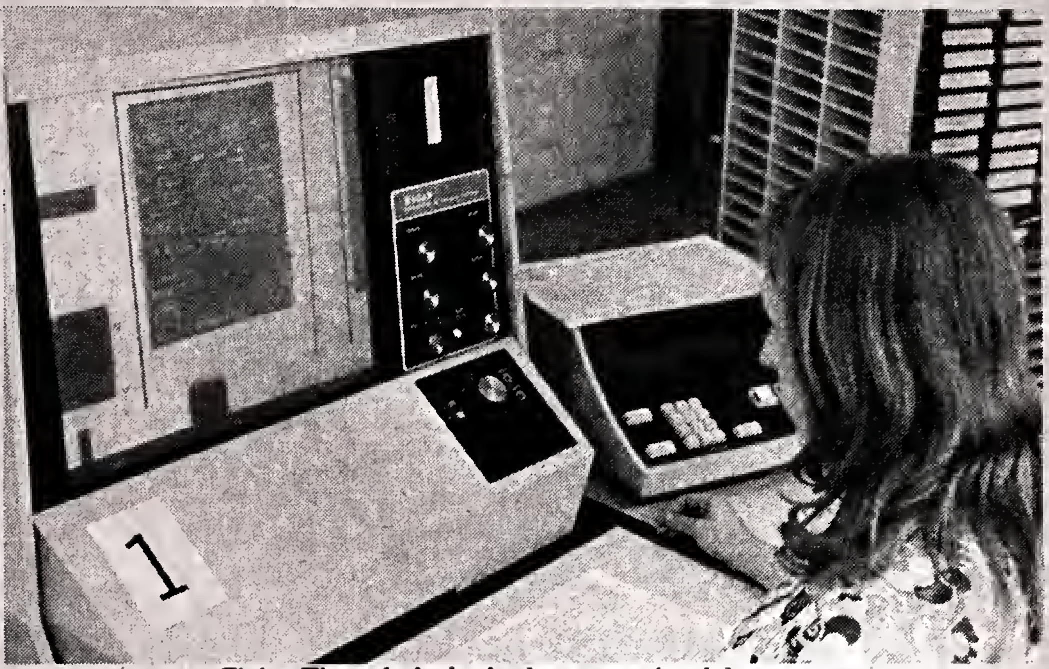
Until recently these records were housed in mechanized files. The average retrieval time was three to six minutes.

Retrievals are now made on either of two Kodak Miracode II retrieval terminals. One clerk checks the index to locate the batch number; another then pulls the indicated microfilm magazine, inserts it into the retrieval terminal and keys in the index number.

The retrieval terminal searches the roll of film and stops to display the desired image on the reader screen. A paper copy of the image can be made in seconds at the push of a button, Brandenburg said.

Lookup Time Reduced

Lookup time has been reduced from about six minutes per inquiry to less than two, he noted.



Flying Tiger clerk checks data on retrieved document.

"In the long run, what really counts in a high-volume operation like ours is retrieval time," Brandenburg said. "Since we began using microfilm, inquiries have more than doubled — to the rate of 650 to 700 a day — and the volume is handled by only 11 clerks on a single shift.

"Inquiries are usually answered within 24 hours, and there are virtually no 'not in files' once an airbill is put on microfilm," he added.

The company now realizes an annual cost savings of $50,000 at the old inquiry rate, Brandenburg estimated, although he suggested the actual figure is probably higher because of the greater number of inquiries. The equipment paid for itself within 18 months, he said.

"It's difficult to put a true value on our ability to respond to inquiries quickly and accurately, but it's obvious that we're saving time for people throughout the company and we're doing a much better job of responding to inquiries from both customers and subcarriers," he added.

Lost Documents

In 1973, the traffic files section was processing 250 to 300 inquiries daily, according to Tanya Beasley, supervisor of traffic files. Documentation could not always be found.

"When you have that many people handling all those files, mistakes are going to be made," Beasley said. There were some 600 "not in files" a week, and one day a week was set aside to search for them.

Even so, some files had to be recompiled from paperwork at originating stations, she added.

Many federal and foreign agencies require the preservation of original documents, so Brandenburg now stores them off-premise. He keeps the working file on 16mm microfilm coded for machine retrieval using the Kodak equipment.

Two-Step Process

After a complete survey of the files in 1973, Brandenburg began converting them early in 1974 in a two-step process. First, a program for computer indexing was established. Now all airbill documents related to originating a shipment are batched in envelopes according to the flight on which the shipment is carried.

The airbills are delivered to cargo accounting, where they are rated and coded, and the data is then entered into computer memory in batches of about 50 airbills each.

The DP department uses the information to produce customer invoices and flight summary statistics. A magnetic tape is also generated which indexes the airbills by batch.

The tapes are then sent to a service bureau, which produces an index on microfiche with a computer output microfilm unit.

When the second step was instituted, Flying Tiger began to record the airbills on 16mm rolls of microfilm with a Kodak Miracode II microfilmer. Filming is done in batches, but part of each airbill number is encoded in machine-readable binary code on the film frame preceding that airbill and related documents.

The film is then processed, loaded into magazines and labeled by the first and last batch numbers contained. At that point the paper documents are sent out for storage.

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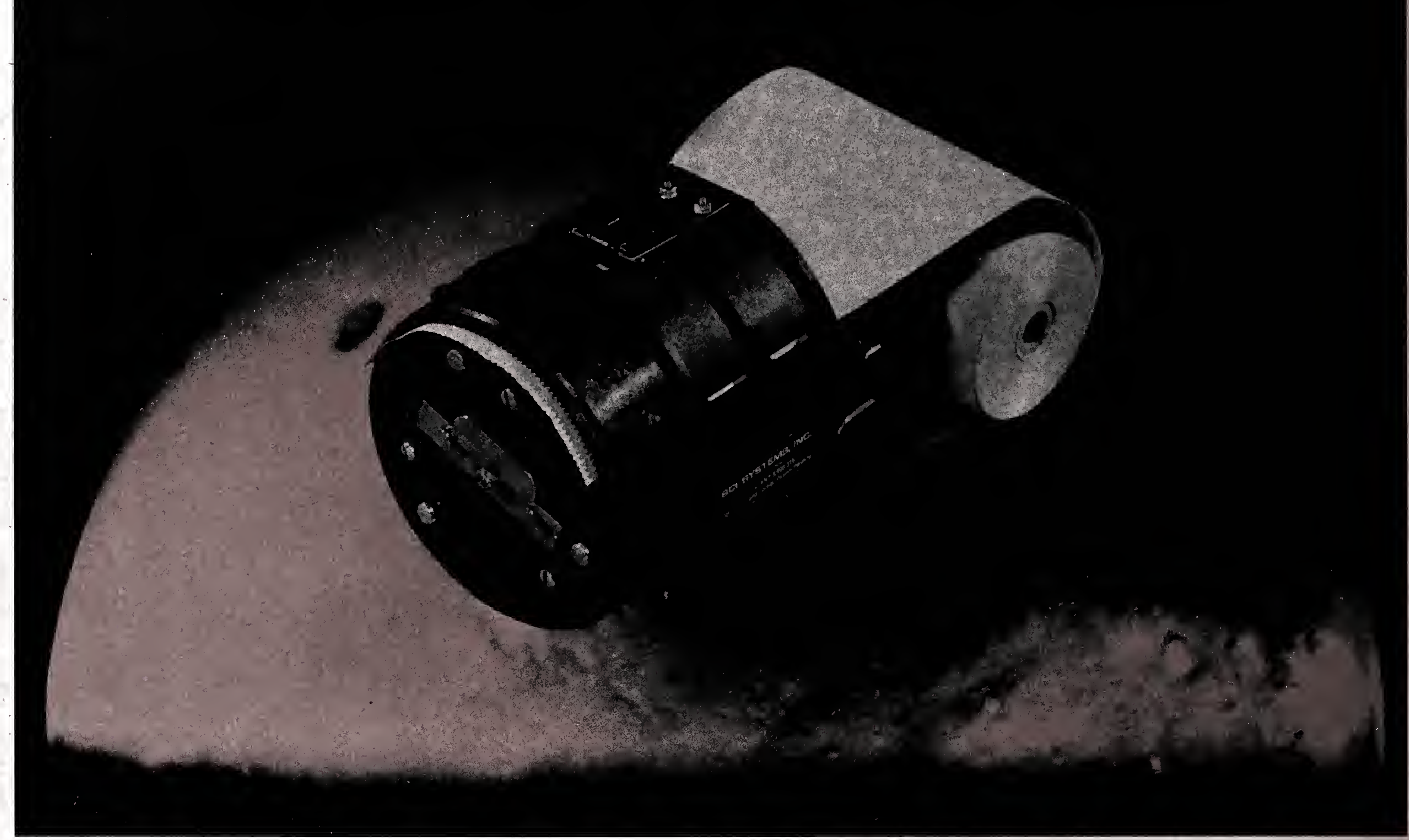

It's true. SCI Systems, Inc., who built the VIKING computer memories—as well as various elements of the SATURN, APOLLO and TITAN systems—has created a new printer which, in all modesty, we must describe as "fantastic."

To begin with, our Rotary Printer operates at 2,200 characters/second. This means that it can print Lincoln's Gettysburg Address in 3/4 of a second and the entire Constitution in 12 seconds.

In addition to its speed, our new printer is economical—from $300 for a basic OEM version to $995 for an end user, stand-alone unit; both with interface electronics.

It's simple—only 9 moving parts and no cams, no levers and no hammers—almost maintenance free. Actually, the only replaceable part is the head which will print more than 25 million characters and can be replaced in 10 seconds.

Our new printer uses electrosensitive paper on which three sets of styli print any number of columns. The paper is moderately priced and readily available. We should also tell you our Rotary Printer is unusually quiet, weighs only 3 pounds and is 4″ wide x 5″ high x 9″ deep.

The immediate, obvious applications for our new unit include: CRT terminals; vehicles, such as police cars and aircraft; teleprinter replacement; minicomputers; microcomputers; and the military.

All of this information has told you that a revolutionary new device has been launched into the world of electronics. We hope that we have your interest and that you are almost as excited as we are. However, until you have actually seen our new Rotary Printer in action, to paraphrase Al Jolson, "You ain't seen nothin' yet!" It is guaranteed to amaze you. So call SCI at (205) 881-1611 and tell us you want to see our Rotary Printer perform. We'll be happy to arrange it.

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Accounting Reports Improve Management of Hospital

By Dale E. Whinnery
Special to Computerworld

MINNEAPOLIS — At the Mount Sinai Hospital here, we can quickly get virtually any type of management information we need — in the form we want it — from the modestly sized, low-cost computer that handles our full range of accounting applications.

For example, we recently produced a detailed comparative study of physician utilization for the past two years. Set up by physician in descending order in terms of overall dollars generated for Mount Sinai, the report listed the number and type of patients by financial class the physician admitted to our institution, average length of patient stay by financial class and the dollars of revenue generated.

We are also able to summarize this data to give utilization by major diagnosis.

This report enables us to see trends. If our revenue from a specific service or physician drops off suddenly, we want to know why. Despite its detail, the report takes only minutes to produce on our Univac 90/30. In the fall, when our Information Management System/90 (IMS/90) becomes operational, we will be able to access this data almost immediately from a terminal.

Flexible Approach

Any hospital with a DP system has the raw materials for a similar physicians' utilization report stored somewhere. But retrieving it can often be a problem.

However, at Mount Sinai we believe we have an exceptionally flexible approach to DP which, by emphasizing continuing integration of information, enables us to retrieve more data faster with less trouble.

To illustrate, we can also produce a comparative study of bad debts by physician or print a variety of special studies, programmed on request and available within two days or less.

These studies can include such things as a survey of rates in a department to determine the funding sources of patients to which services are rendered or special analyses of our senior citizens' program which reveal inpatient utilization or the number of tests per outpatient visit.

Surgical Charge System

In addition, we have a surgery charge system that is coded according to standard medical practice. There are six major factors in a surgical procedure: equipment, setup, cleanup, staffing, supplies and time. We have identified 500 procedures and, by use of a standard cost system, have arrived at 17 types of procedures and developed their base price.

Additionally, we charge by the minute, based on the number of people involved in the procedure. Naturally, there are differing time charges for such things as a tonsillectomy and open-heart surgery.

Obviously, this is a more accurate approach than averaging rates. A patient with a minor problem receives a minor bill, which is in line with current trends in the health care industry. It would be difficult to use this approach and charge accurately without a fast, flexible computer system.

The system is similarly helpful in budgeting. Out total hospital budget must be prepared annually and submitted to regulatory agencies. We must also cost out our budget to properly establish rates.

After we operate on a budget for two or three months, we find ourselves making cash flow decisions regarding cash requirements for capital expenditures, leases and/-or borrowing that go beyond our normal budget year. So, while most budgeting is limited to a year, our budget renews itself monthly.

Thus, we always have a year's forecast in hand although we're still working with the current year's budget. We can see our cash flow situation at all times and make cash flow decisions with confidence.

More Than History

In short, the system provides more than history; it provides meaningful and timely data which, in essence, allows us to make informed management decisions. When such facts are available in the proper time frame, we firmly believe that whatever a hospital's operating weaknesses, the proper application of these facts can alleviate them.

As an example, our system produces accurate, detailed productivity reports for all departments. Initially we worked with a local management engineering firm to develop productivity standards for these departments.

The 90/30 compares actual hours worked with standard hours, taking into account census fluctuations or, in ancillary departments, the applicable actual number of tests or procedures.

Detailed Reports

Detailed reports go to department heads every pay period. A summary is also sent to Peter H. Sammond, executive director.

"The advantages to us of DP are no longer purely financial. Granted, we get good, sophisticated financial reports each month. But more and more we look forward to integrating these systems with the productivity system.

"This will enable us to review patient care and speed identification of problem areas across the board. In the past, we have just had to search for them on a sampling basis," Sammond said.

Currently the following systems are on our 90/30: inpatient/outpatient billing, accounts receivable, payroll, personnel, accounts payable, general ledger — with financial statements produced on the fourth working day after the close, inventory, mailing, preventive maintenance, property accounting, production reporting, physician utilization, clinic billing, revenue analysis, flexible budgeting, Medicare logging, collections, tape-to-microfilm history and patient admission analysis.

The overall benefits of automating these applications include improved speed, accuracy and quality, substantial labor savings and, as indicated, a dramatic improvement in our ability to manage the institution.

Package Allows Printing Of Bar Codes on 360/370

HOUSTON — Information Products Systems, Inc. has a hardware/software package that is said to allow IBM 360/370 users to attach label printers to their mainframes.

Styles available with the package include Universal Product Code, Plessy and Monarch Code-a-Bar.

The controller and software package costs $7,500 from the firm at 6565 Rookin, Houston, Texas 77074.

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DATASHARE 4 takes the mystery and complication out of extensive communication tasks by using simple commands like SEND and RECEIVE. The difficulties of communications have been eliminated while the effectiveness and potential has been expanded.

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And, of course, with the new increase in processing speed, all of the local business data processing chores can be performed even faster. In certain applications, this increased processing speed can range up to five times more than with the previous system. With this sharply upgraded processing capability, DATASHARE 4 can be of even greater assistance in removing a substantial processing burden from the central network computer.

New peripherals

DATASHARE 4 may also be implemented with Datapoint's new 20 megabyte disk unit plus a wide variety of other peripherals, including several different types of high speed printers; a new matrix printer for use with Datapoint 3600 terminals in your remote locations; tape drives; and a wide variety of communications equipment.

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User Microprogramming Feature of Low-End Eclipse

By Esther Surden
Of the CW Staff

WESTBORO, Mass.— Data General Corp. has announced a low-end Eclipse system featuring user microprogramming.

Described as a general-purpose system that brings supermini capabilities to the minicomputer mid-range, the Eclipse S/130 features an optional integral floating-point instruction set.

The system is designed for laboratory and industrial, data communications, timesharing and business system users. OEM applications such as image DP, seismic processing and computer-aided design can also be accommodated by the system, DG said.

The S/130 is similar to the recently introduced Digital Equipment Corp. PDP-11/60, according to a DG spokesman. It fits in a range somewhat below most large-scale minis and above general-purpose minicomputers, he added.

The system is not field upgradable to other members of the Eclipse line, he said.

The system uses a 12-slot chassis with an optional expansion chassis available. It can accommodate up to 256K bytes of MOS, core or mixed main memory, DG said.

Memory is increased in 64K-byte increments and memory cycle time is 500 nsec. The semiconductor memory features error correction and battery backup is optional, the spokesman noted.

The S/130 uses the Eclipse instruction set. Users can also add the Eclipse C/330-compatible character handling instruction set to augment the standard instructions, DG said.

Instruction Set Capability

The system features custom instruction set capability through user microcode storage in either random-access memory (RAM), writable control store or programmable read-only memory (Prom) control store.

The writable control store offers 1K 56-bit words. It was designed for users with scientific or educational applications.

The Prom control store provides 2K 56-bit words of nonvolatile microcode designed for users, such as OEMs, who would be concerned with machine security or protection of proprietary code, the firm noted.

The RAM and Prom microcodes feature a 200-nsec cycle time. The 56-bit control word contains 15 separate fields, similar in structure to those used in other Eclipse systems, the spokesman said.

System software includes DG's advanced operating system and its real-time disk operating system, which provide for multiprogramming and concurrent batch and real-time operations, the firm said.

The system uses Fortran 5, Fortran IV, single- and multiuser Basic and Algol. Application support software includes utilities for remote job entry; sort/merge for business requirements; the Communications Access Manager and the Sensor Access Manager.

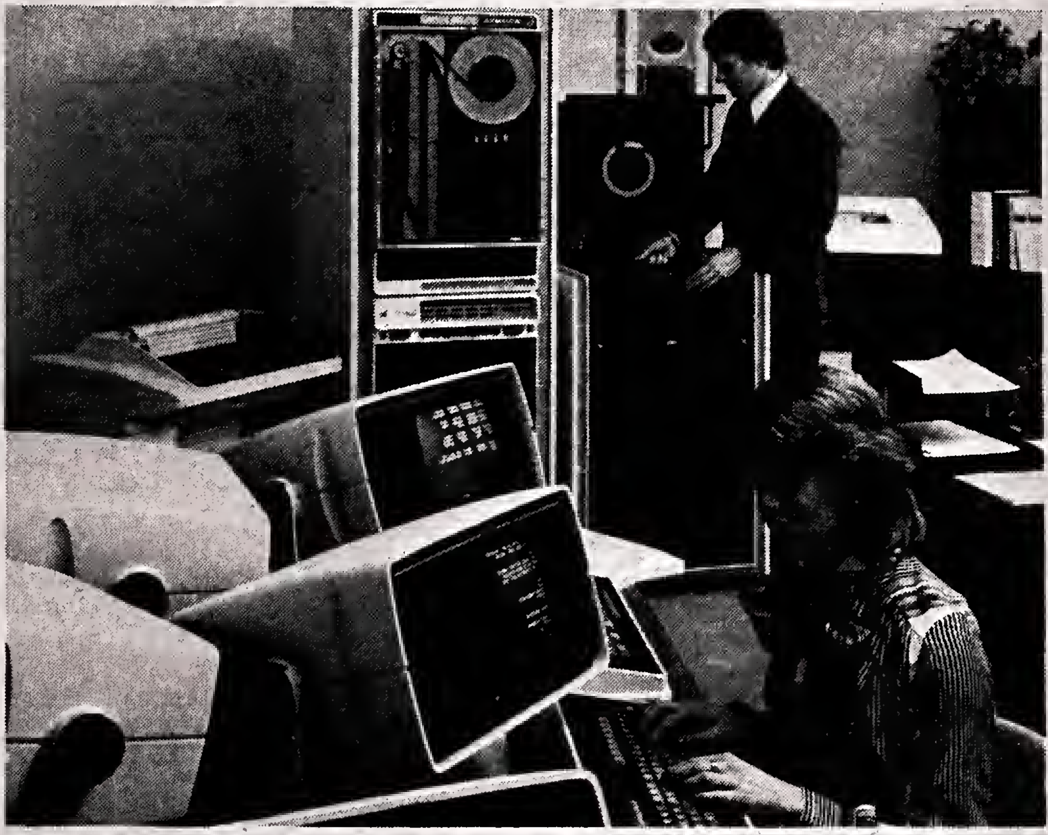
An S/130 with 32K bytes of core costs $11,000.

A large system includes 192K bytes of semiconductor memory, battery backup, floating-point instruction set, character handling instruction set and writable control store.

It also includes real-time clock, 96M bytes of disk, 75 in./sec magnetic tape, communications subsystem with four displays, four dial-up asynchronous lines, one synchronous line and a 60 char./sec Dasher terminal.

The large system costs $88,020.

The writable control store costs $4,000, the Prom storage costs $1,000 and the floating-point capability costs $2,000, DG noted from Southboro, Mass. 01772.



DG Eclipse S/130

Programs Under Development

User's Difficult Move Ends in Success

By Esther Surden
Of the CW Staff

DALLAS — Three and a half years ago when Allied Automation moved its operation here from Chicago, it was in the middle of software development and an uncertain future was in store for the system's maintenance.

But the company was committed to move and what resulted is the firm's success story, according to Bill Sherman, chairman of the board.

Before moving to Dallas, the firm contracted with a Chicago programming firm to develop the programs for a manufacturing, planning and control system on its recently acquired Basic/Four Corp. system.

"We went on-line with the system in October 1973 and were more than satisfied with the results," Sherman indicated. The firm also put accounts receivable, accounts payable, payroll and general ledger on the system.

But when the firm decided to move to Dallas, software development was not completed. With luck on the firm's side, it "continued to get additional programs from our Chicago software contractor for some months after the move, so implementing our system in Dallas was really no problem," Sherman said.

Now, however, there may be a problem if the company ever needs to have more programs written for it. The software contractor was "a bit shakey" the whole time the firm dealt with it and has since gone out of business, he noted.

The company was also concerned about service. "When we first got here, Sorbus here had no experience with Basic/Four equipment," Sherman said.

"I had the feeling that the man who was doing preventative maintenance was going to screw up the system," which happened "once or twice," but with no real detriment to the company, he indicated.

"When we decided to move here, we saw that Sorbus was here and we didn't investigate further," he noted. It turned out that the firm initially did not service Basic/Four at all in this area and the only reason it did was because Mack Truck bought one and needed service, Sherman said. "It was a little scary," he noted.

Service is very good now that more people in the area have the systems, he said.

The company kept an active hand in documenting the system when it first arrived and as the software was being written, Sherman said.

As a result, "I can do some simple programming." His niece has also studied computer science and may do some programming if need be, he said.

"The main thing that concerns me is that we put more and more responsibility into

(Continued on Page 48)

Intel Has Add-On Memory Board

SUNNYVALE, Calif. — Intel Memory Systems has introduced a single-board memory system for minicomputer and general-purpose use with up to 128K bytes.

The In-3000 random-access memory system features variable storage capacity per board, fast access time, built-in error correction and maintenance by replacement of individual storage elements rather than complete boards, the firm said.

The basic system operates as a single-board, self-contained memory and stores up to 64K words or 128K bytes, together with parity or error correction coding (ECC) bits.

The same board also contains system interfaces, controls and the optional ECC subsystem.

Access time of the basic In-3000 single-board system is 275 nsec; cycle time is 450 nsec. The ECC option adds 50 nsec to access time, but provides 10 to 25 times higher data reliability than memory systems with conventional parity checking, Intel claimed.

Compatible With Micro 3000

The In-3000 is compatible with older micro 3000 core memory systems, the firm said.

Each In-3000 board can replace up to eight conventional micro 3000 core memory boards, plus auxiliary boards, and reduce power dissipation 75% or more per bit, the firm added.

Prices range from .02- to .03 cent/bit in OEM quantities. A typical single-board system storing 64K words is priced at $3,600 and the ECC option at $4,350 in single quantities.

Deliveries are scheduled to begin in May, Intel said from 990 E. Arques Ave., Sunnyvale, Calif. 94086.

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Mini Bits

Turnkey Mini Manages Stock, Option Portfolios

SANTA BARBARA, Calif. — A turnkey minicomputer to manage stock and option portfolios for financial institutions such as pension funds and life insurance companies is available from Moline-Bollay, Inc.

Based on a Data General Corp. Eclipse C/330, the Sabar Mark II system monitors portfolios in real-time, the company said.

The system selects options according to criteria predetermined by the user as optimum investment goals. It analyzes the options for the risks and rewards involved and monitors them for optimum selling time or flags if an option is about to be lost, the firm stated.

The Sabar system also prints out stock charts, provides profit and loss summaries and performs transaction accounting on individual stocks, it noted.

A basic system includes a 72K-word CPU, magnetic tape subsystem, 10M-byte disk, color graphics terminal and a printer plotter. It costs $500,000.

Moline-Bollay is at 240 Las Altures Road, Santa Barbara, Calif. 93103.

Power Monitor Isolates Minis By Providing Proper Voltages

COSTA MESA, Calif. — The Power Mite MK I from Computer Power Systems Corp. is said to isolate minicomputers from the outside world by providing all the proper voltages and currents required by the components of the systems.

The unit can be specified from 5- to 45 kVA and is shielded. It can accept input voltages of 480-, 460-, 240-, 220- or 208Vac, the firm said.

Power is fed to an electrostatically shielded, computer-grade isolation transformer which automatically adjusts for voltage variations, the firm stated.

Up to 30 single-phase or 10 three-phase lines can run from the Power Mite MK I. A variety of combinations can be programmed, the company noted.

The unit is easily moved, the company claimed, saving installation costs at a new site.

The cost of the system varies from $3,000 to $6,000 depending on rating and options.

The firm is at 3300 Harbor Blvd., Building H-5, Costa Mesa, Calif. 92626.

Add-On Storage Memory Cards Developed for HP 21MX Line

SANTA CLARA, Calif. — National Semiconductor's Memory Systems Division has developed a series of add-on memory storage cards for use with the Hewlett-Packard Co. 21MX and 21MXE family of computers.

The NS-21 memory boards have a capacity of 16,000 words of 17 bits each and are compatible with the HP system models 2105, 2108, 2112 and 2113, according to National Semi.

They are used with a control card manufactured by National Semi or with the HP21 MX series control card, a spokesman added.

One control card can communicate with up to 12 16K NS21 storage cards for a total storage capability of 192K words. The 16K version of the NS21 replaces two single density 8K cards, the firm said.

The 16K by 17-bit version of the NS21 memory storage card sells for $995. It is available for immediate delivery from National Semi, 2900 Semiconductor Drive, Santa Clara, Calif. 95051.

HP 2100 Minis Get Dual-Channel I/O Card

CUPERTINO, Calif. — Intermedia Systems has an OEM I/O card for Hewlett-Packard Co. 2100 series minicomputers that provides two synchronous graphics display channels for use with standard CRTs.

The two channels on one board offer either one four-color display or two independent black and white displays, Intermedia said.

Each display is stored in a local screen refresh memory. This random access memory permits a random plotting rate in excess of 300,000 points per second, a spokesman added.

The 4426 dual-channel graphic video generator I/O card costs "less than $1,000 per channel" in 50-unit quantities, Intermedia said from 10601 S. Saratoga-Sunnyvale Rd., Cupertino, Calif. 95014.

Correction

The price of an Information Products Systems, Inc. 285 char./min card reader subsystem ["PDP-11 Gets Reader Link," CW, March 21] is $3,200. The interface card costs $600.

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Auerbach Report Helps Users Configure Their IBM 3s

By Esther Surden
Of the CW Staff

PENNSAUKEN, N.J. — Configuring the IBM 3 small business system can be a headache for users who rightfully ask, "How can I upgrade my system and how does my model compare to other models in the IBM 3 family?"

To help users "evaluate their present systems in terms of upgrading and comparability," Auerbach Publishers, Inc. has released a 54-page report devoted to the six members of the IBM 3 product line.

Complete with "configurators" which graphically diagram the hardware, software and main memory storage requirements for software support and peripheral options, the report presents each system in detail.

The accompanying 3/15 configurator, for example, shows users exactly what equipment can be directly attached to the CPU, how the system can be expanded, what equipment is required for purchase and what units are optional.

Compatibility evaluations are presented for each system along with pricing information.

For example, the report noted that users converting from the Model 10 to the Model 12 might run into some programming problems. "Some macro instructions used in Model 10 Assembler language programs may need modification before reassembling with the Model 12 Assembler," Auerbach warned.

Also, data files from the 3/4, 3/6, 3/8 and 3/10 must be transferred from the IBM 5444 cartridge disk to the Winchester-type disks at an IBM data center equipped with a larger 3/15 which can handle both types of disks, the report continued.

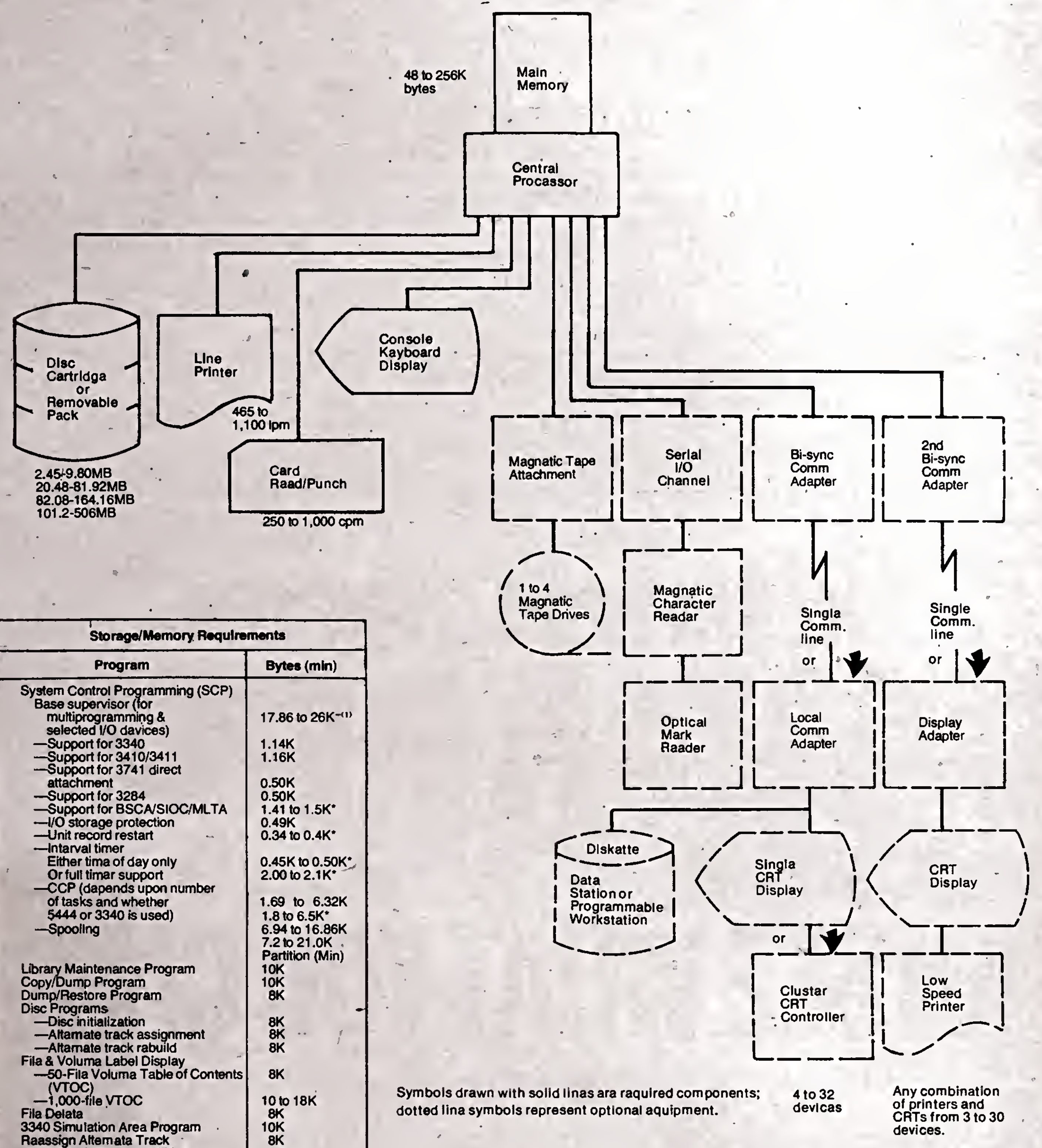
Even the oft taboo subject of attaching non-IBM gear to the system is broached with Auerbach noting that "it is not difficult to attach equipment made by other manufacturers to the Model 12, though IBM discourages such attachments."

About the 3/15, the report said the General Services Division "has made the Model 15D the obvious choice for current System 3 users who want to upgrade their installations to faster and more capable machines with a minimum of conversion effort.

"Upgrading to a Model 15 from another System 3 machine or from an IBM System 360 Model 20 or 1130 generally involves rewriting Assembler language programs and recompiling source language programs," the report continued.

"On the other hand, upgrading from a Model 15 to an IBM 370 Model 115 is quite complicated."

The report is available for $15 from Auerbach Publishers, Inc. at 6560 N. Park Drive, Pennsauken, N.J. 08109.



Symbols drawn with solid linas ara raquired components; dotted lina symbols represent optional aquipment.

Storage/Memory Requirements

Program	Bytes (min)
System Control Programming (SCP)	
Base supervisor (for multiprogramming & selected I/O davices)	17.86 to 26K⁻⁽¹⁾
—Support for 3340	1.14K
—Support for 3410/3411	1.16K
—Support for 3741 direct attachment	0.50K
—Support for 3284	0.50K
—Support for BSCA/SIOC/MLTA	1.41 to 1.5K*
—I/O storage protection	0.49K
—Unit record restart	0.34 to 0.4K*
—Intarval timer	
Either tima of day only	0.45K to 0.50K*
Or full timar support	2.00 to 2.1K*
—CCP (dapends upon number of tasks and whether 5444 or 3340 is used)	1.69 to 6.32K 1.8 to 6.5K*
—Spooling	6.94 to 16.86K 7.2 to 21.0K Partition (Min)
Library Maintenance Program	10K
Copy/Dump Program	10K
Dump/Restore Program	8K
Disc Programs	
—Disc initialization	8K
—Altamate track assignment	8K
—Altamate track rabuild	8K
Fila & Voluma Label Display	
—50-Fila Voluma Table of Contents (VTOC)	8K
—1,000-file VTOC	10 to 18K
Fila Delata	8K
3340 Simulation Area Program	10K
Raassign Altemata Track	8K
5445 Data Intarchanga Utility	8K
Tape Initialization	8K
Tape Error Summary	8K
Ovarlay Linkage Editor	10K
System Genaration	30K
Macro Processor	12K

Nota (1) 26KB is tha minimum storage requirement for tha System/3 Model 15D basa supervisor; this figure includes 3340/3344 support and an addnl 2K fila sharing araa.
* Requiremants for Model 15D

Chart Courtesy of Auerbach Publishers, Inc.

The IBM 3/15 configurator demonstrates what equipment can be added to a user's system.

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Conversion to Turnkey Cuts Importer's Staff in Half

CHICAGO — By converting from service bureaus to an in-house minicomputer, a supplier of imported Christmas decorations and giftware here has been able to put all its order entry, inventory control and cash management functions on-line.

The firm, Silvestri Corp., cited benefits such as improved cash flow, reduction in office staff by 50% and standardization of product information.

In addition, buyers now obtain up to date detailed sales analysis, according to Richard Feldstein, vice-president and treasurer.

The system, which handles order entry, inventory control, accounts receivable, billing and sales analysis, costs $600/mo more than the $1,800/mo the firm was spending for the service bureaus, Feldstein said. The service bureaus, however, only handled accounts receivable and inventory.

The turnkey system, which incorporates a Four-Phase Systems, Inc. System IV/70 and software from Systematics Corp., is operated with no DP staff as such, he noted.

The firm's business is highly seasonal and involves a large number of small orders to many customers. Manual procedures, while adequate, were expensive and less timely than the company wished, he said.

The buyers needed timely sales statistics on product lines and individual customer preferences in order to estimate consumer demand accurately.

Thorough Planning

Silvestri installed its system in January 1975. Feldstein believes that its success is the result of thorough planning.

The firm's accountant, Touche-Ross, prepared a feasibility study that called for an on-line integrated system with turnkey applications software. Silvestri then developed a detailed system specification and sent it to prospective suppliers.

The company considered Digital Equipment Corp., IBM and Singer gear before settling on the Four-Phase system. The system was chosen on the basis of hardware value and reputation for service, he stated.

Silvestri management worked closely with Systematics to define each application, Feldstein added. Programs were demonstrated to the firm as they were written.

Feedback from the employees who actually had to work with the system was seriously considered and programs were modified where necessary before the system was delivered.

As a result, the turnkey software and hardware were delivered together — on time.

Several applications were converted from the service bureaus to the new system via tape. The first trial balance of some 1,500 accounts balanced perfectly, Feldstein said. After one month of parallel operational, the Four-Phase system was declared fully operational, he added.

Feldstein combined extensive advance planning and close cooperation between the software developers and Silvestri users with a business decision to minimize the firm's risk if things did not work out.

The contract with Systematics called for payment on installation and acceptance of a complete working system. Silvestri leased the hardware from Four-Phase on a 12-month contract.

No Silvestri people were actually involved in systems design or programming. In this way, Feldstein kept his financial commitment low, making the turnkey approach less of a gamble.

Completed System

The Silvestri system consists of one Four-Phase System IV/70 with 48K bytes of memory, three video terminals, 300 line/min printer, 50M-byte disk drive and magnetic tape for file backup.

All applications are written in Cobol and are accessible individually and concurrently via the video displays.

A menu of available programs allows operators to choose the application they need. The selection ranges from order entry and cash posting to display and update of customer, product and inventory records.

The system's content-addressable data base stores all information only once, yet Silvestri personnel can access it in a number of ways.

For example, sales data may be displayed for items or for customers. Customer records can be displayed by customer number or by Zip Code. Similarly, orders can be accessed by customer or by ship date.

Batch control of data, planned from the outset, is a major reason for the effectiveness of the system. Clerks enter batch totals for each order (which typically consists of several line items) and for batches of 10 to 15 orders.

Feldstein said the Silvestri management feels the Four-Phase system can handle future growth with no reprogramming. The addition of one video display will be sufficient to handle an order rate double the current volume.

User's Move OK After Shaky Start

(Continued from Page 45)

the system and, if it breaks, we go home," he said.

The system has thus far been very reliable, he said.

When the firm considered systems three years ago, the Basic/Four was deemed "best for our needs," Sherman said. "I like what I have," he continued, but "I have no idea" what the market is like today.

Back then he considered Wang and NCR Corp. and chose the Basic/Four because of its on-line capabilities.

Used Service Bureau

Allied Automation manufactures and sells automatic packaging machines and maintains an inventory of about 2,500 to 3,000 items. Prior to going with the small systems, it used a service bureau.

"In all, we have some 220 programs on the Model 400, but the number of reports produced on a regular basis is relatively small, Sherman said.

The most important capability is multilevel bill of material processing, Sherman indicated. "The system tracks items that will be needed from inventory for each level of subassembly and assembly we build," he said.

Initially, the firm had a Model 350. "We didn't really need to upgrade at the time we did," he stated, but the firm did increase the system's disk capacity because the cost of the upgrade was going to go from $1,000 to $4,000, he explained.

The system now has two disks, one CRT and one printer.

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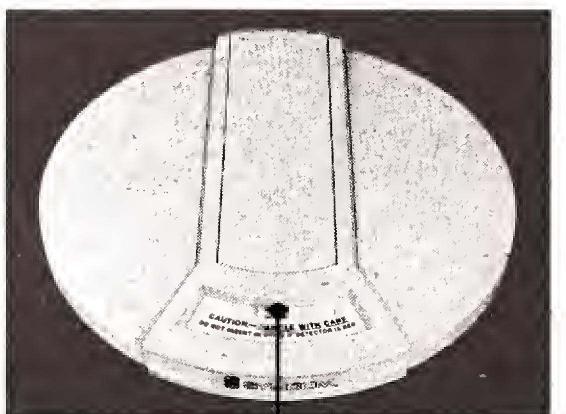

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Graphic System Does Double Duty

HUNTINGTON BEACH, Calif. — McDonnell Douglas Astronautics Co. here began using an installed interactive graphics system for mapping work—even though it was designed for drawing electronic circuits.

Now, the astronautics firm is expanding its use of the equipment to include the type of work for which it originally was designed.

In response to requests from other McDonnell Douglas Astronautics departments, the system is helping in the design and production of printed circuit layouts, schematic diagrams, mechanical drawings, facility layouts and data graphs.

In February 1974, McDonnell Douglas Astronautics created a venture to handle mapping contracts and bought a graphic data system (GDS) from Calma Co.

It is comprised of a minicomputer controller, plus a 48-in. by 60-in. backlighted digitizer table with five-button cursor and digital X-Y coordinate displays, a CRT video display and a 64-character keyboard. A high-speed digital plotter is linked to this.

In effect, the graphic data for drawing such things as printed circuits is digitized for ease in reproduction.

Working at the digitizer table, J.P. Demeter, in charge of computerized mapping at McDonnell Douglas, can manipulate the data, viewing his efforts on the video display screen.

When the work is done to his satisfaction, the data is entered into a permanent system file, Demeter noted.

At any time, this stored material can be used to draw diagrams or circuits on the system's large flatbed plotter, which draws at high speed while selecting any one of four pens to provide variable line widths or different colors to add emphasis to the drawing, he explained.

In creating a circuit schematics of transistors, diodes, capacitors or resistors, in which whole sections are repeated in various parts of the diagram, Demeter can create the section once and then have the computer repeat it wherever else it is needed. Before, this sort of work had to be done laboriously by hand, he added.

GOS 'Very Versatile'

Of course, using computers to aid in engineering graphics is not new, Demeter stated, adding he opted to use the equipment for mapping instead of its intended function.

"The GDS is very versatile," he commented. "We used it for land-use classification programs, with satellite data and for local mapping jobs."

The company already was engaged in projects involving spectrographic analysis of terrain for land-use analysis. An airplane would fly over the area to garner optical data in five spectral bands as electrical impulses on magnetic tape, Deneter said.

In turn, combinations of this spectral data would be used to indicate such phenomena as location of certain types of trees, their relative age, other types of vegetation, etc.

The GDS system converts the aerial "photos" into line drawings and regional coding showing the disposition of natural resources, roads or other elements in any sector covered.

For a U.S. Corps of Engineers land-use study, the information from the "photos" was extracted and scaled to create land contour maps showing such details as the flood plain area, he said.

Also, Demeter's operation took over the data base of another McDonnell Douglas subsidiary which was doing mapping work for the city of Fountain Valley, Calif.

"We now maintain the entire city in a number of categories," he said. "We have a base map of the city streets which can be produced by itself or with any or all for the other city information, such as the complete sewage system, the entire water distribution system, all tracts and lots, and the zoning map of the city."

These maps have been updated annually under city contract, he added.

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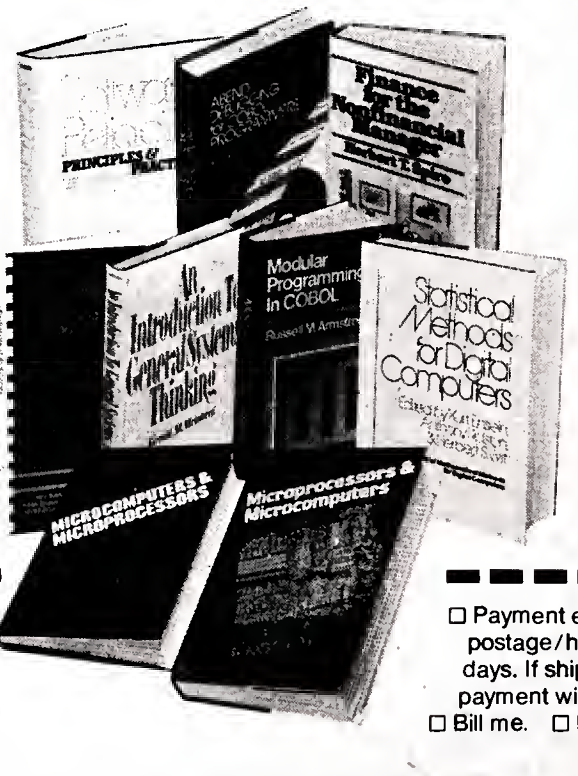

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Turnkey Gathers Data for Labs

DUARTE, Calif. — A turnkey system designed for data acquisition in small to medium-sized laboratories is available from Neff Instrument Corp. here.

The System 620S includes a Hewlett-Packard Co. 9825A programmable calculator interfaced to the Neff System 620 analog processor.

The analog processor selects a channel for measurement, amplifies and filters the analog signal and provides analog-to-digital conversion, Neff said. The calculator provides system control.

The calculator features a 32-character display, 16-character strip printer and a keyboard. An integral two-track tape drive is used to load or record data and programs.

Data acquisition programs which are supplied with the system can be called up using the calculator's 12 function keys, a spokesman added.

A 16-bit parallel read with hardware interface provides data transfer rates up to 43,000 sample/sec in direct memory access mode with an amplifier per channel system option and up to 9,800 sample/sec with a differential multiplexer.

The system costs $15,000 from Neff at 1088 East Hamilton Road., Duarte, Calif. 91010.

System Puts Artists' Ideas on Fabric Faster

ST. LOUIS — In an unusual case of technology transfer, a minicomputer-based military reconnaissance system concept has been adapted to make bikini bathing suits.

The Orchard Corp. of America, headquartered here, is finding the adapted system having an impact not only on bikinis, but on the whole textile industry.

The system, called a Response System 200 and built by an Israeli company called Sci-Tex, has enabled Orchard to slash by more than half the time it took to produce printed fabric from artists' sketches, the user said.

Incorporating a Hewlett-Packard Co. 2100 minicomputer as its control processor, the system automates the conversion of artwork into color separation negative films which are then used to make rotogravure cylinders.

Orchard then prints the design onto its special Ortherm paper, which is used by the textile mills to transfer the design to fabric. Wallpaper, flexible decorative foils, packaging and wood grain designs are also produced with the high-speed system.

The system uses full-color optical scanning adapted from use by the military in analyses of aerial photography.

"In some cases, when we want to really impress a customer, we can convert artwork to printed paper or fabric samples in a matter of hours — a process that takes weeks if done with traditional methods," according to Irving Lackritz, general manager of Orchard's Ortherm Division. "In addition, the results are of higher quality."

Sketches to Engravings

Using the Sci-Tex system, the artist's sketches or actual fabric samples are scanned with the high-resolution Response 200 Super Scanner and digitally stored in the mini.

A color console is then used to develop, alter and touch up the design; the system then produces the screened film overlays for each color. The screens are then used to make engravings identical to those used in ordinary gravure paper printing.

The final step is printing the design on paper. This paper version is then shipped to the textile mills, where the design is transferred to fabric using a process called "sublimination." In this process, the dye goes from a solid state on the paper to a gaseous state and back to a solid on the fabric.

The sublimination process is basically the same heat-and-pressure technique used to produce today's "while-you-wait" T-shirt designs. Introduced about four years ago in the U.S., the process now accounts for a large percentage of the textile printing business.

System Operation

The operator loads the artwork onto the Response 200 scanner. This may be any multicolored or monochrome graphic design or pattern, such as an artist's sketch, painting, photograph or fabric.

Using a CRT terminal, the scanner is calibrated to recognize up to 12 different colors and shades for the particular design. This step is completed quickly, and the graphic and color description is converted to digital data and stored in the mini's HP 7905 disk memory.

The scanner is a drum-type unit capable of handling reflective or transparent copy up to 36 inches square.

The scanned design is displayed, in color, on the Color Design Console. Using the electronic stylus and the special functions available with the console keyboard, the operator then modifies, manipulates and retouches the basic design.

For example, the basic pattern can be repeated on the fabric in any arrangement — square set, half drop or irregular drop.

The colors and design can be changed in any way desired; details can be added, sharpened or deleted. The system's memory can store hundreds of design effects and structures which can be applied to any design at any time, Orchard said.

In addition, a color library is used to recall any of hundreds of colors, and new colors can be created. The variations in color using the same basic pattern, called colorways, are compared for final selection by the designers.

Patterns are displayed on the ultrahigh-resolution color television monitor with a 19-in. screen. The pattern can be displayed at the same size that will be produced on the final film or it can be reduced as many as 10 times, thus permitting several pattern repeats to be viewed at once.

This amounts to viewing several yards of the fabric, allowing pattern flaws to be discovered. On the other hand, blown-up segments of the design can be examined for minute detail quality.

When the operator is satisfied with the design and with the accuracy of the two-dimensional fit of the repeated pattern on the whole fabric section, the digital data is transferred to magnetic tape using the HP 2100.

This tape, containing the data on each color, is then removed and placed on another tape unit which is part of the Response system's laser camera film-producing system. Here, the screened sheet of film for each color is automatically produced.

The Sci-Tex laser plotter is a fast, large-format, high precision and general purpose graphic x-y plotter. It uses a laser beam to expose the film in a raster manner.

The film is attached to a rotating drum. The unit can be operated off-line or on-line to the HP computer.

Overall plot size can be up to 40 in. by 73 in. The plotter uses any standard graphic arts film, which is then processed in a conventional automatic processor.

This screened separation film is next taken to the engraving department where a copper cylinder treated with a light sensitive coating is wrapped with the film, exposed and bathed in developer that leaves the image engraved on the cylinder for printing.

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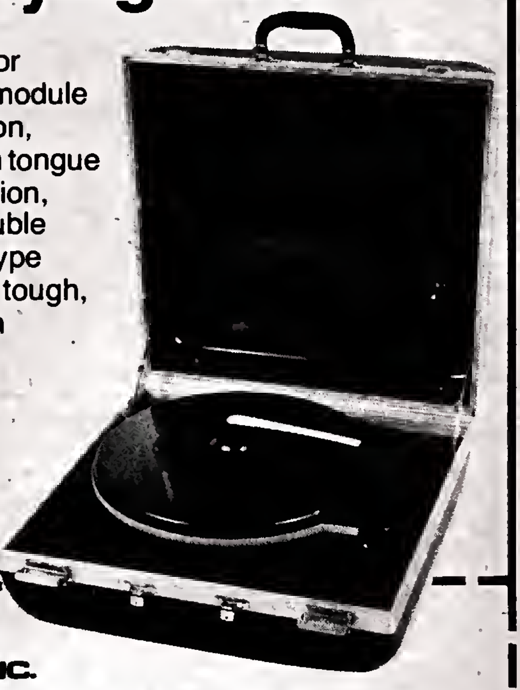

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COMPUTER INDUSTRY

No Production Cutbacks Expected

'Silicon Valley' Prepares For Water, Power Shortage

By Molly Upton
Of the CW Staff

Several semiconductor firms do not expect ill effects from the water shortage in northern California.

"Silicon Valley" will probably be spared rolling blackouts this summer despite the reduction in hydroelectric generating capacity caused by the continuing drought here.

According to results of a meeting between several of the state's utilities, southern California sources can supply more than the amount Pacific Gas and Electric (PG&E) estimates it will need, a spokesman from the Western Electronic Manufacturers Association (Wema) reported.

The southern California firms use oil and natural gas to power their generators.

Although PG&E is anticipating a 30% loss in hydroelectric generating capacity, it should be able to meet the area's needs in 1977, but by a thin margin, the firm said at the meeting.

However, it warned, should one plant go down, then it might need to resort to rolling blackouts. In addition, it will have to charge more because it will be burning more oil.

However, Southern California Edison indicated it has ample capacity and can supply more than PG&E's anticipated shortfall if the projections are accurate.

In addition, San Diego Gas and Electric said it can supply about one-quarter of PG&E's anticipated shortfall.

Unscheduled blackouts could cause damage to both the batches of wafers in the furnaces as well as the costly diffusion furnaces, according to a spokesman for one semiconductor manufacturer.

However, if advance notice is given, production can be scheduled accordingly and backup power systems used, he added.

Fairchild Camera and Instrument Co.'s Semiconductor Division has a task force of facilities engineers which are meeting with water and power companies to enable both sides to better deal with the situation, a spokesman said.

(Continued on Page 58)

AT&T Blamed for Demise of 14 Common Carriers

By Ronald A. Frank
Of the CW Staff

ATLANTA — In 1973 there were 17 firms in the specialized common carrier business, but today only three are left as a result of the anticompetitive tactics of AT&T, according to C. Gus Grant, president of Southern Pacific Communications.

Speaking at a conference here recently, Grant said the remaining specialized carriers have had to be a tenacious group to survive the actions of Bell.

The specialized carriers have had six years of constant battle with no intermission, he said.

First, Bell claimed the new carriers did not have the technical know-how to offer carrier services and predicted that any facilities built by the carriers would never be interconnected with the existing phone network of the telephone companies, he stated.

In the face of these threats, the first users of the new carriers really needed a strong desire to exercise free choice, Grant told the attendees.

Commenting on the lessening Congressional support for the AT&T-fostered Consumer Communications Reform Act, Grant said, "the bill would put us out of business" and also hamper the operations of the Federal Communications Commission (FCC).

"AT&T's tactics have backfired, but they show the true colors of AT&T. [AT&T seems] to feel that the only good competitor is a dead competitor," he said.

Bell would turn the clock back 10 years to when it enjoyed a technical monopoly, but the advent of satellites and computers has put AT&T behind in the introduction of innovations, according to Grant.

One company cannot sit in judgment for all the products and services required by the public. "We should give the bill a decent burial and get on with meeting the telecommunications needs of the general public," Grant said.

Procedures Unworkable

Turning to regulatory problems, Philip Walker, general counsel for Telenet Communications Corp., said the present ratemaking procedures are unworkable in that they cannot prevent Bell from subsidizing one service with revenues from another.

Even though Bell loses rate cases when it is asked to justify its prices for service, the phone company continues to offer the serv-

(Continued on Page 54)

IBM Never to Lead Mini Mart But Seen Holding 15% by 1981

By Toni Wiseman
Of the CW Staff

MENLO PARK, Calif. — IBM's Series/1 marks the beginning of a major thrust by the giant into the minicomputer market.

Although IBM will not become the market leader, it will reach a significant competitive position within two to three years and, by 1981, will capture 15% of the mini systems shipment value, according to a report by Quantum Science Corp. here.

The Series/1 is a move to stave off the growing competitive thrust of minicomputer manufacturers into the end-user market, the report indicated.

Quantum predicted IBM will ship about 900 Series/1 systems this year for a total value of $19.8 million.

"Most importantly, IBM's thrust into the minicomputer market will raise the level of support given to and then expected by end-user customers.

"To remain competitive, minicomputer companies will be required to bear the cost of meeting these new customer support standards," the report stated.

IBM requires additional markets to maintain its traditional annual revenue growth rate of 13%, Quantum indicated.

Expansion into new areas such as computer services, communication services and office/communications equipment will ease the situation, but expansion within the traditional DP markets will also be necessary, the report said.

"IBM's mainstay — the general-purpose computer market — will grow in shipment value at less than 7% per year over the next five years and equivalent annual user expenditures for the system will grow at less than 12% during this period," the report stated.

IBM's strategy with the Series/1 has been to minimize the effort and time required to enter the minicomputer market by initially restricting the product and its markets.

In the next three years, the minicomputer industry will evolve to offer enhancements such as more sophisticated and flexible systems software, including interactive capability; increased availability of high-level, business-oriented languages; higher performance peripherals, particularly large disk storage; increased main memory at reduced cost; and increased emphasis on

(Continued on Page 54)

IBM Retires Tendered Shares

ARMONK, N.Y. — IBM has retired the approximately 2.565 million shares it purchased recently from shareholders, according to a spokesman.

The move could raise slightly the potential dividend per share for the same capital outlay, observers said.

The 2.565 figure is an increase over the previously reported 2.546 million shares tendered [CW, March 21].

The retirement of these shares decreases the number of outstanding shares from about 150.7 million to about 148.1 million.

IBM had offered to purchase up to 4 million shares at $280 apiece [CW, Feb. 28].

On the books, the retirement means the firm has about $720 million less in current assets and similarly, on the other side of the ledger, about $720 million less in stockholders' equity, the spokesman said.

Part of the latter reduction appears in the value of capital stock and part in retained earnings, he added.

IBM is paying about $37.7 million or $2.50 a share in its latest dividend payable to shareholders as of Feb. 9 — an increase of 25 cent/share from the previous dividend.

Should the firm pay the same outlay during the next dividend period, each share would receive about $2.54 in dividends, according to calculations.

The spokesman stressed that the figures on the number of shares retired and the expenditure, therefore, are approximate as shares are still being rendered to the company.

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AT&T Hit for Carrier Demise

(Continued from Page 53)

ice while the issues are being heard.

This hurts competitors who are forced to compete against unreasonably low rates, Walker said.

After Bell's private-line rates were found to be subsidized by its monopoly telephone service, the phone company introduced its Dataphone Digital Service (DDS).

The DDS offering was also later found to be priced below its actual cost to AT&T, but while the issues were being debated, Data Transmission Co. (Datran) went out of business, Walker said.

Separate Subsidiary

The solution to this problem is to require that Bell offer its competitive services through a separate subsidiary which would keep separate accounts and be authorized to get its carrier facilities from AT&T, a specialized or any other carrier.

The separate competitive arm of AT&T would be prohibited from providing monopoly telephone services, but it would be free to offer all services for which there was competition, Walker suggested.

Private-line and switched services would be offered by this competitive entity and the same rules would apply to the six largest independent phone companies as well, he said.

Competition Assured

This type of separate subsidiary would conform to the rules already laid down by the FCC in the area of satellites and DP services, and it would go a long way toward assuring that competition could thrive for all carriers, Walker added.

Speaking for AT&T, R. Brian Johnson warned that the FCC's competitive decisions are changing U.S. national telecommunications policy on a piecemeal basis.

If these decisions continue, users will be hurt by technical innovation, duplication of service and quality of service problems, he said.

Technical innovation will be cut back, duplication of service will raise rates to customers and the quality of service will drop, Johnson said.

"Let's make sure we get true competition and a policy that upholds the public interest. The FCC is not carrying out the intent of the Communications Act," he said.

No Evidence

Walter Hinchman, chief of the FCC Common Carrier Bureau, said it was unfortunate that AT&T missionaries were being sent out to preach the gospel of the Reform Act "without a shred of evidence."

The argument that competition will bring as much as a 75% increase in residential phone rates is full of logical holes, and there is no sensible consistent evidence to support the AT&T arguments, Hinchman said.

The issues raised by the bill are really ones of political intrigue and public accountability, he continued.

And, in the final analysis, the question that must be answered is to what extent a free society will allow monopoly control, he noted.

IBM Never to Lead In Mini Mart: Study

(Continued from Page 53)

communications capabilities.

"IBM will parallel these industry trends by announcing:

- "An IBM-supported system control program by the end of 1977. This will permit the release of Ansi standard compilers such as Fortran by mid-1978.
- "IBM-supported interfaces for higher performance disks such as the IBM 3340 (Winchester drive) as well as medium- and higher speed printers such as the IBM 1403 by the end of 1977.

Important Advantage

- "A fixed-term lease plan in 1977 for the Series/1 followed by a modified rental plan in 1978. This will give IBM an important advantage over the minicomputer companies which conduct their business on either third-party leases or purchases.
- "Additional models of the Series/1 which will permit memories beyond 128K bytes with software incorporated within read-only memory to be released by mid-1978," Quantum predicted.

The Series/1's primary impact will be on the System 7, Quantum observed. It will not, at present, compete with the System 3 or System 32, "but with future enhancements will overlap the markets for these products toward the end of the decade."

End-user-oriented minicomputer manufacturers, such as Hewlett-Packard Co., will be the most heavily impacted, while Digital Equipment Corp. and Data General Corp. will come up against IBM as they move toward the end-user market, the report said.

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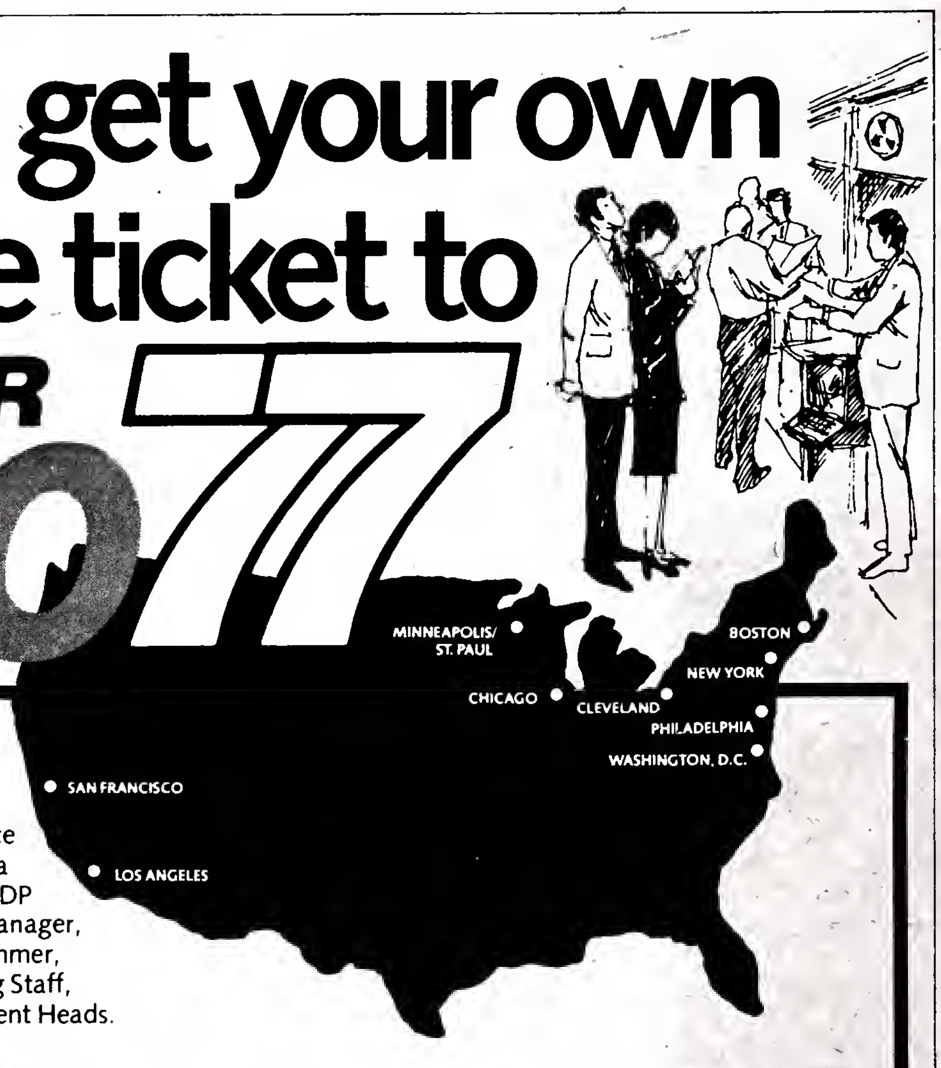

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Computer Exports Contribute To '76 Positive Trade Balance

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C.—Increased exports of computers and related equipment were responsible for the lion's share of a 4% increase in the U.S. favorable balance of trade in business machines during 1976, according to the Department of Commerce.

U.S. business machines went up from a positive trade balance of $1.72 billion in 1975 to $1.785 billion in 1976, the department said in a recent report on exports and imports of business machines and computers.

Exports of business machines for 1976 were $3.021 billion—an increase of 11% from a year ago—while imports rose to $1.236 billion, up nearly 25%, the commerce study stated.

Sales of computers and related equipment abroad were $2.587 billion—up 16% over exports of these machines in 1975.

Within this category, computers and their parts rose 15% to $1.339 billion. Computer-related and statistical machines went up 8% to $197 million; I/O equipment rose 20% to $654 million and storage devices increased 4% to $363 million, the Commerce Department said.

Canada remained the principal customer for U.S. computers and related equipment, purchasing machines valued at a total of $408 million.

The UK bought $305 million worth of computers and associated devices, West Germany bought $293 million, France bought $273 million and Japan bought $239 million, the commerce report noted.

Socialist countries including Eastern Europe and Yugoslavia, Mongolia, the Peoples Republic of China, Cuba, Vietnam and North Korea acquired $36 million worth of U.S. computer equipment from the U.S.

Latin American countries exchanged $146 million for U.S. computers, the report said.

While exports of computers and related equipment constituted the greatest chunk of all exports of business machines, these devices also exhibited the largest relative increase among import trade categories—up 83% to 235 million in 1976.

In 1974 U.S. imports of computers hovered around $115 million and in 1975 around $128 million, the department noted.

Most of these machines came into the U.S. from Canada — $112 million of computers and related equipment. About $77 million of the U.S. computer imports arrived in this country from Europe.

Another $42 million came from the Far East, not including Australia, New Zealand, India and Pakistan, the report said.

Included in the business machines category with computers and related equipment are typewriters and their parts, calculating and accounting machines and miscellaneous office machines, the report noted:

Foreign Trade Group Formed as Advisers

LAGUNA BEACH, Calif. — Paul J. Linebarger and Marc de Geyter have announced the formation of Inmark Associates, international sales specialists.

Inmark will assist small- and medium-sized technical companies in establishing international sales organizations. At present, less than 8% of all qualified U.S. manufacturers are doing any significant business overseas, according to Linebarger.

Unlike many "foreign trade" experts who are merely export agents, Inmark will select distributors and/or representatives, establish pricing, forecast, administer promotional programs, conduct sales and service training, coordinate export/import activities and advise in the financial problems of international money management, he added.

Inmark headquarters offices are at 222 Grandview St., Laguna Beach, Calif. 92561 and Prins Boudewijnlaan, 78, B-2610 Antwerp, Belgium.

Datatrol Signs Intent Letter To Gain Amcat Line

HUDSON, Mass.— Datatrol, Inc., a subsidiary of Applied Devices Corp., has signed a letter of intent with Addressograph-Multigraph Corp., of Cleveland, to acquire that company's Amcat terminal product line.

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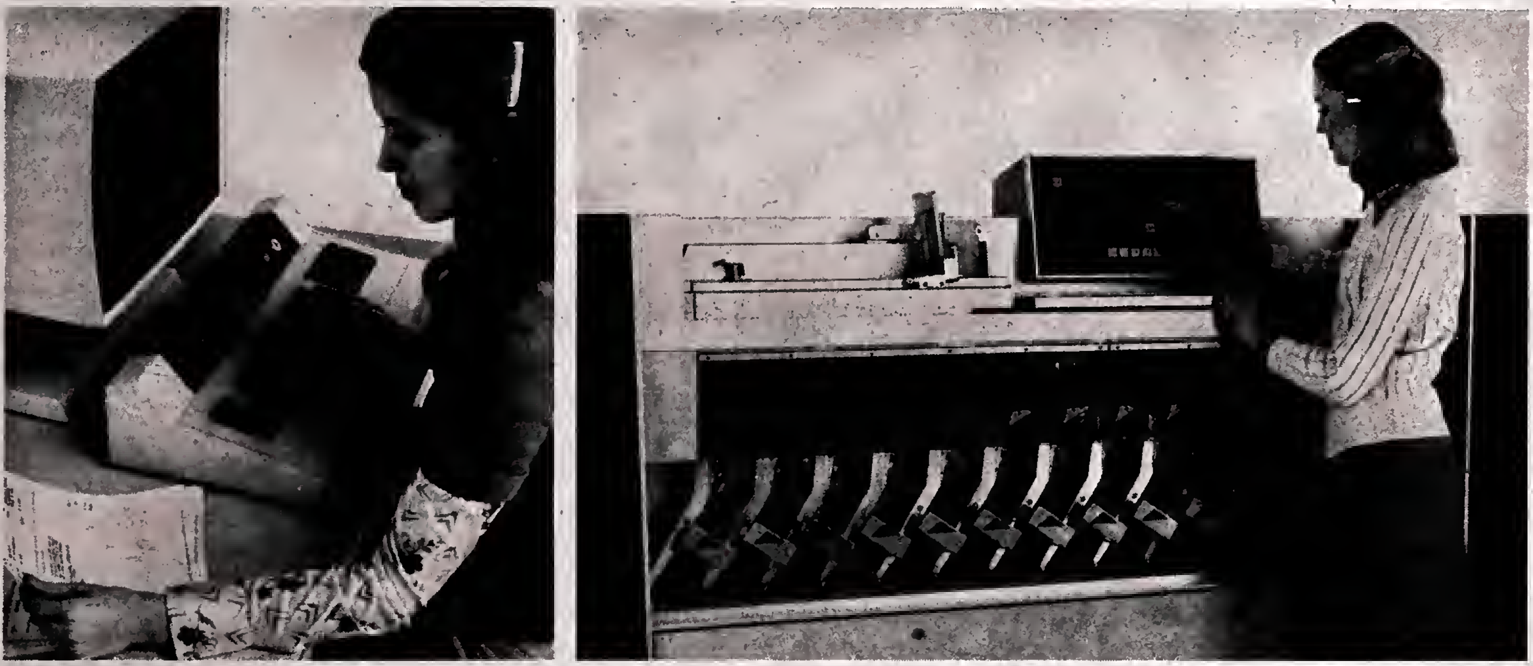

What do the biggest names in business have in common?

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Financial News

Burroughs Sets Records in '76 For Revenues, Earnings, Orders

DETROIT — Burroughs Corp.'s revenues from rentals and services increased 23% to account for 42% of total revenue during 1976, Chairman Ray W. MacDonald told shareholders at the recent annual meeting.

The firm set records in orders, revenue, earnings and shipments.

Revenue from the outright sale of products and other services increased 5% compared with the 1975 figure, MacDonald said.

For the year, revenues rose 12% to $1.9 billion; revenues from U.S. operations increased 7% while revenues from overseas operations rose 19%.

Incoming orders increased 17% over 1975, with DP systems and products recording the strongest gain. Terminal products turned in a particularly strong performance, he said.

Earnings climbed 13% to $185.9 million, with 60% coming from U.S. operations, he stated.

Shipments of DP equipment at sales value reached a record level, rising 14% to $1.63 billion including custom systems and business minicomputers, MacDonald said.

Shipments are expected to increase at a similar rate in 1977, he added.

Deliveries of the 800 systems have started, and full delivery flow should be reached by 1978, he predicted.

President Paul S. Mirabito noted "production levels in 1976, measured in terms of net factory value, were slightly less than 1975. This reflects a shortening of inventories in relation to revenue and was achieved even though we had a heavy schedule of new product introductions.

"We anticipate production levels will rise moderately in 1977, following our continuing plan to shorten inventory in relation to our rising revenue forecast, which is an important part of our total program for improved asset utilization."

Burroughs' use of advanced product technology resulted in lower manufacturing costs, he said. The firm expects to increase production within its present manufacturing space since many of the products are of smaller dimensions.

The firm's plant expansion over the next five years will be at a lower rate than that in the previous 10 years, Mirabito said.

The company will be "able to concentrate more on [its] capital spending on advanced tooling . . . and other technological aids for further increases in new product introductions and manufacturing efficiencies and place lesser emphasis on new construction," he said.

Of the total capital expenditure during 1976 of $267 million, $203 million was spent on additions to the firm's rental base.

In 1977, capital expenditures are expected to increase to $310 million, with about $230 million earmarked for rental base additions, he stated.

During the year, Burroughs reduced its debt by $100 million with a year-end ratio of total debt to equity plus total debt of 26%.

A similar debt reduction is expected in 1977; plans do not call for outside financing in the near to intermediate future, Mirabito said.

Burroughs' board of directors recently raised the quarterly dividend from 17 cents per share to 20 cents per share.

Honeywell Trades Stocks For GE Interest in HIS

MINNEAPOLIS — Honeywell has completed its plan to purchase 1.4 million shares of its common stock and exchange them for the General Electric Co.'s (GE) remaining 11.7% interest in Honeywell Information Systems, Inc. (HIS).

Honeywell said repurchase of its own shares eliminated the need to issue additional shares to acquire GE's interest in HIS.

The transaction followed procedures established in 1970 when HIS was formed by the merger of the general-purpose computer businesses of Honeywell and GE. At that time, GE owned 18.5% of HIS; GE's interest was reduced to 11.7% in January 1976 through the exchange of 800,000 shares of Honeywell common stock.

GE has assured the U.S. Department of Justice it will sell all the Honeywell stock acquired as part of the merger by Dec. 31, 1980.

Teaching your computer to count cornflakes, cookies and whoppers.

A special report on *Source Data Entry* in the May 30th *Computerworld.*

A great deal of attention and effort has been directed toward automating the data entry process over the years. And it's easy to see why. The usefulness of your entire computer system is inextricably linked to the speed and reliability with which you convert raw data to machine-readable form. *Computerworld's* May 30th special report will be looking at just how far we've come with data entry — and, possibly, where we're going.

Edited by Frank Vaughan, this report will take a comprehensive look at source data entry methods, including:

- Places it's commonly used — supermarket check outs, airline reservation systems, hamburger stands, etc.
- A survey of contemporary equipment — scanners, POS registers, badge readers, mag stripe readers, key-tape and key-disk systems, the newer hybrid systems, and the emerging technology of voice data entry.
- An evaluation of the impact distributed data processing (DDP) is having on distributed data entry (DDE) — do these approaches dovetail or does DDP diminish the use of DDE? Are large scale, centralized data entry sites becoming obsolete?
- The state of the art — equipment speeds and technical trade-offs. Innovative applications like voice input and using the telephone as a terminal.
- What's ahead — Input from smaller users just getting into computer automation through data entry; e.g., how merchants regard the costs, projected savings, and their need for automated data entry methods. Possible impact on consumers.

If you're a DP manager, supervisor, or corporate manager who's concerned with the cost effectiveness of DP, be sure you read the special report on Source Data Entry in the May 30th *Computerworld.* If you manufacture and market data entry equipment you'll want to advertise here. Don't miss the May 13th ad closing date. Contact your *Computerworld* salesman — or call Terry Williams at (617) 965-5800.

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OEM Products

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TI Unveils 92K Bubble Memory

HOUSTON — Texas Instruments, Inc. has unveiled a 92K-bit bubble memory with sample quantities priced at $200 each.

The firm also announced a host of other memories as well as a 64K charge-coupled device (CCD) [CW, March 21].

The bubble, designated the TBM0103, is suitable for portable data storage applications such as programmable calculators and intelligent terminals, according to TI.

A custom MOS controller is available to provide microprocessor compatibility and a family of interface integrated circuits is in development with prototype availability scheduled for late 1977, the firm said.

At 100 kHz operation, access time is 4 msec for the first bit, and cycle time for the 144-bit page is 12.8 msec, with a power consumption of .5W for continuous operating, the firm said.

Storage in the bubble is nonvolatile from -40° to 85° C, according to the firm. The diameter of the magnetic bubble domains is five microns.

Patterns of permalloy metal are deposited on the epitaxial film to define the path of the bubble domains in the presence of a rotating magnetic field, TI said.

As the field rotates, the bubble domains move under the permalloy pattern in shift register fashion.

Device architecture is major loop/minor loop. Data bits are written into and read out of the major loop; data bits are transferred to minor loops for storage.

Bubble control functions such as generate, transfer in, transfer out, replicate and annihilate are executed by providing current pulses through the appropriate control elements on the chip, TI said.

The bubble is packaged in a 14-pin dual-in-line module.

In other memory products, TI announced a 16K erasable programmable read-only memory (Eprom) called the TMS 2716, a plug-in replacement that doubles the capacity of TI's TMS 2708.

The TMS2716 was designed for high-density, fixed memory applications where low power dissipation, fast turnaround and/or program changes are required.

The unit costs $54.75 each in 100-lot quantities.

A dynamic 4K, 16-pin random-access memory (RAM) expands the firm's line of 4K devices to include 16-, 18- and 22-pin versions. The TMS4027 is priced at $19.20 in 100-piece quantities.

In addition, the firm added four fully static 4K RAMs, each of which comes in four speed ranges: 450-, 300-, 200- and 150 nsec maximum access times. For quantities of 100, prices on the units, designated TMS4044 through 4047, are $12.40 for those with 450 nsec access and $20.15 for those with 150 nsec access.

TI can be reached through P.O. 1443, M/S 669, Houston, Texas 77001.

Hitachi Readying Disk Series For Release in U.S. Market

NEW YORK — Hitachi, Ltd., has unveiled two series of small disks for the OEM market in the U.S. which feature both fixed and moving heads as well as versions without the fixed heads. All are fixed-disk types.

Storage capacity of the Disk File MFD 90F and MFD 90-F2 are 1.95M bytes whereas the DK 62 series are 10.8M- and 21.7M bytes.

Prices range from $1,650 to $4,000 in quantities of 100.

The DK 62 series' positioning technique uses swinging arm actuators and track servo positioning, the firm said.

The DK 62-10 and DK 62-20 have memory capacity of 10.8M- and 21.7M bytes with an average access time of 50 msec, Hitachi said. The models DK 62-10F and DK 62-20F have .122M bytes of fixed head that permits an access time of 10 msec, according to the firm.

Average access time of the MFD 90-F and MFD 90-F2 is 190 msec for the moving head of 1.95M byte. The 90-F has fixed-head capacity of .061M byte and an average access time of 10.3 msec while the 90-F2 with its fixed-head capacity of .143M byte has an average access time of 8.8 msec.

Quantity prices for the DK 62-10 and DK 62-20 are $3,000 and $3,600 respectively. The fixed-head feature is an additional $400. Prices for the MFD 90-F1 and MFD 90-F2 are $2,200 and $2,500 respectively.

Delivery is scheduled for the fall. Information is available from Bell and Stanton, Inc. 666 Fifth Ave., New York, N.Y. 10019.

Contracts

Computer Sciences Corp. has been awarded subcontracts totaling $28 million by RCA Corp. for the design and implementation of computer programs for the combat system engineering development phase of the U.S. Navy's Aegis ship combat system.

EG&G, Inc. has received a $3 million contract from the Portland District of the U.S. Army Corps of Engineers for the design, development and maintenance of a water resources data management system in the Pacific Northwest.

Ramtek Corp. has been awarded a $2.7 million contract by Pfizer Medical Systems, Inc. The contract calls for Pfizer to purchase RM9100 Medical Imager display systems for use in its 0200 and 0200FS Acta Scanner Systems.

Data General Corp. has received an OEM contract from Advanced Computer Techniques (ACT) for Nova and Eclipse minicomputers. ACT plans to provide turnkey systems using the DG equipment.

Systems Engineering Laboratories (SEL) has been awarded a $1 million contract by Philips Gloeilampenfabrieken of Eindhoven, The Netherlands, for SEL 32 series computers.

Collins Commercial Telecommunications Division of Rockwell International's Electronics Operations has received a $1.8 million contract from the Wisconsin Telephone Co. to furnish digital microwave equipment and installation services at 14 sites between Madison and Eau Claire, Wis.

GTE Sylvania, Inc. has received a $1.1 million modification to a U.S. Army research and development contract. The contract modification calls for providing technical data for a system that provides computer-controlled electronic processing, data storage and retrieval.

Dynalogic Corp. Ltd. has been awarded a contract by CNCP Telecommunications to supply dual-drive floppy disk systems.

Shugart Associates has received a corporate purchasing contract from NV Philips Gloeilampenfabrieken, Eindhoven, the Netherlands.

Aeronautical Research Associates has received a contract from Plastec, a technical information analysis center, for the delivery of an engineer-oriented material properties information and analysis computer program.

Dataproducts Corp. has been awarded a $2.5 million contract by Univac for core memory systems.

Four-Phase Systems has extended its sales contract with Philips Data Systems, The Netherlands, for two years.

80-Column Printer Offered for Micros; Runs at 1 Line/Sec

LOS ANGELES — An 80-column alphanumeric dot matrix printer for use in microcomputer terminals as well as other systems is available from C. Itoh Electronics, Inc.

The Model 7080, which sells for $250 each in lots of 500, can handle up to three copies of 8.5-in. fan-fold paper, the firm said.

Print speed is 1 line/sec; the unit weighs 5.5 lbs., according to Itoh, which is marketing the printer made by LRC, Inc. of Riverton, Wyoming.

The unit is said to permit the use of a simple electronic interface. The paper feed mechanism is tractor feed.

Itoh is at 5301 Beethoven St., Los Angeles, Calif. 90066.

Expansions

Electronic Memories and Magnetics Corp.'s Computer Products Division has added a facility located at 3216 W. El Segundo Blvd., Hawthorne, Calif. 90250, to expand its engineering and manufacturing operations.

GTE Data Services, a subsidiary of General Telephone and Electric Co., has purchased a four-story building from Grinnell College.

Digital Equipment Corp. is planning to build a $6.5 million plant on a 205-acre site in Augusta, Maine, pending certain environmental revisions.

CMI Corp. has moved to larger international headquarters at 1500 N. Woodward Ave., Birmingham, Mich.

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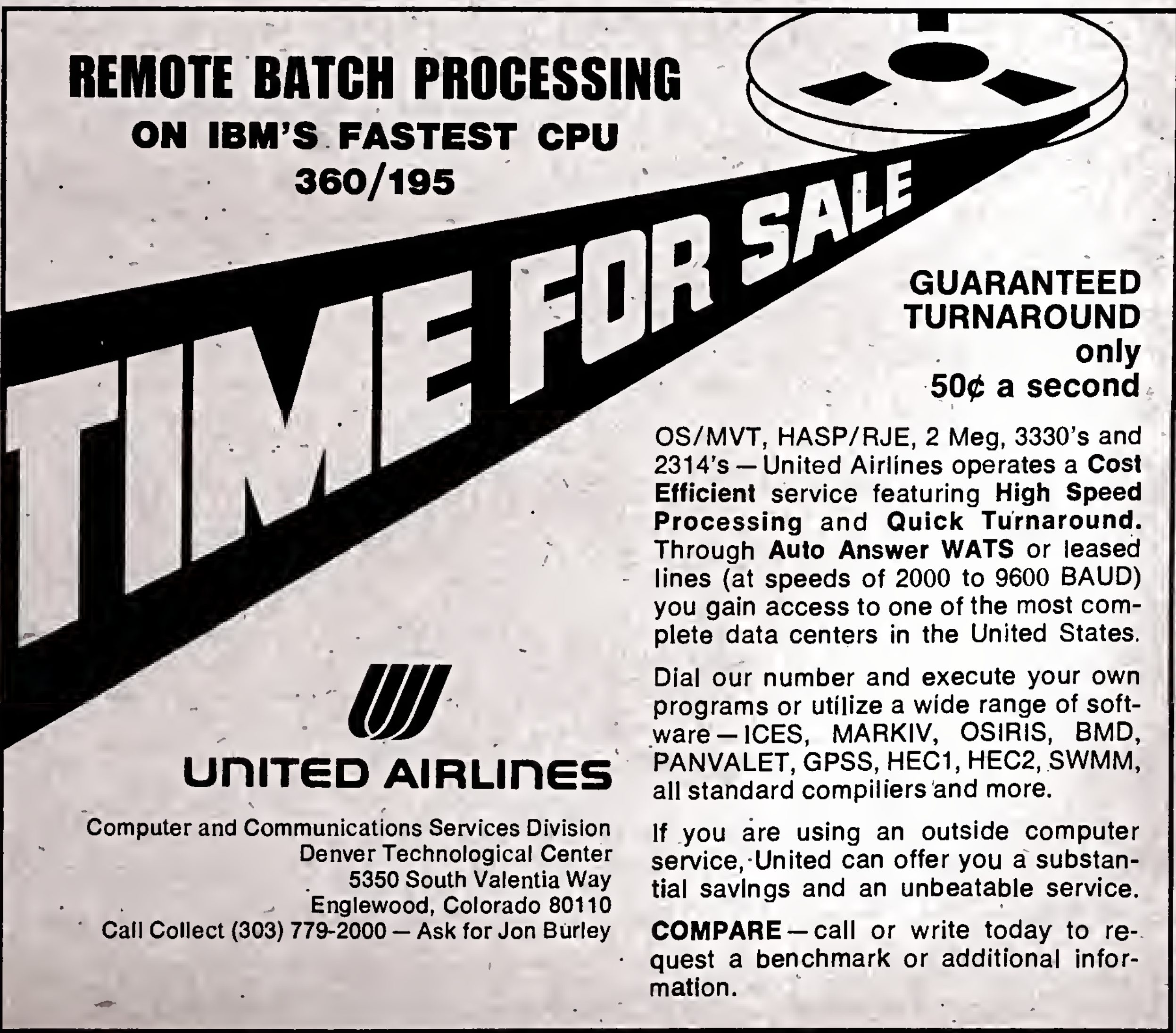

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Semi Firms Prepared for Shortages of Water, Power

(Continued from Page 53)

But water is critical to the semiconductor makers not only as a source of power, but as an ingredient in washing off products after numerous acid baths.

Fairchild isn't anticipating any production cutbacks because of the water shortage and resultant rationing being instituted by local communities, according to the spokesman.

Fairchild has been able to reduce its water consumption at various plants between 25% to 75% already, prior to the imposition of rationing, he said.

Its wafer manufacturing plant in the Palo Alto-Mountain View area has reduced its use of water by 25% with no curtailment in production and the firm is reasonably sure it can reach 50% by July or August, he said.

Savings Sources

The savings have resulted from reducing usage in other areas as well as in direct functions of the manufacturing process, he said.

There has been no major recycling of water yet, although the firm is optimizing its use of water by washing more than one batch in a rinse, he said.

The Fairchild plant that makes diodes in Marin County, one of the hardest hit areas, has cut back its water consumption 75% in comparison to requests by the county for a 50% reduction, he observed.

There has been no effect on production, and the firm is looking at alternative means of cutting back still further, he said.

For instance, in Healdsbrug, where Fairchild makes silicon wafers, the firm is drilling wells, he added.

Fairchild also has semiconductor production facilities in South Portland, Maine and Wappingers Falls, N.Y., but the spokesman said the firm doesn't see any need to shift production.

The water situation varies among locales, he stressed. For instance, Fairchild's new LSI plant is in South San Jose, Calif., which has ample water resources, he said.

Rationing plans have been announced for the Santa Clara area, and are prorated according to one's usage in the same month last year, he added.

A spokesman for National Semiconductor Corp. indicated the firm has not been affected by the water shortage.

Although it uses substantial amounts of water in acid baths and fabrication processes, much of this is reclaimed and reused, he said.

The firm is attempting to reduce its use of water in the plant, he added.

Intel Corp. does not have a large proportion of its wafer production facilities in northern California, a spokeswoman said. It has a facility at Livermore where advanced work is done.

Another facility in Santa Clara serves almost as a "prototype" facility where quality control can be ensured, but it is not responsible for much of the water volume.

Executive Corner

- Henry W. Bauer has been appointed executive vice-president of Teledyne Inet, a division of Teledyne, Inc.
- Herbert J. Richman has been elected senior vice-president by Data General Corp.'s board of directors.
- William K. Marrinan has been appointed senior vice-president of Telex Computer Products, Inc.
- John J. Flanigan has been elected executive vice-president and chief operating officer of Kalvar Corp.
- Edward E. Strauser has joined Escom, Inc. as vice-president of finance.
- Thomas L. Thomas has been named senior vice-president of ADP Network Services, Inc.
- Dr. John W. Poduska has been appointed vice-president of research and development at Prime Computer, Inc.
- William R. Landfried has been elected a vice-president of Capital Data Systems, Inc.
- H. Jack Reynolds has been elected vice-president of sales for Micro Information Systems, Inc.
- Edward B. Crosland, senior vice-president of AT&T, retired on Feb. 1.
- Lawrence V. Beckman has been elected vice-president of marketing and Baldwin A. Hickey vice-president of finance for Tano Corp.
- Charles E. Splaine has been named vice-president of sales for Memorex's Equipment Products Group.
- James J. Woo has been elected a senior vice-president of Datapoint Corp.
- Eric V. McGlone was appointed vice-president and general manager, Europe-Africa Division, International Group, and Gordon A. Curry was appointed vice-president of marketing, Western region, in Burroughs Corp's. Business Machines Group.
- J. Allen Hufft has been promoted to general manager and divisional vice-president of University Computing Co.'s Commercial Division.
- Dan Walkovitz has joined Computer Sharing Services as vice-president of marketing and Robert Wegsten has been promoted to the newly created post of vice-president of technical services.
- Theodore Weicker has been appointed vice-president of Logical Machine Corp.
- Will B. Rodemann has been named vice-president and general manager of domestic operations for the Business Products Group at Control Data Corp.
- Jim McKenna was elected vice-president for commercial sales for American Satellite Corp.
- Joseph C. Conway has been appointed EDP program manager at Signetics' Logic Division.
- Garret C. Doninger has been named scientific marketing manager by Interdata, Inc.
- George J. Sideris has been appointed to the board of directors of Applied Digital Data Systems, Inc.
- Donald V. Seibert has been elected a director of Sperry Rand Corp.
- Dr. Lawrence G. Roberts, president of Telenet Communications Corp., was promoted to chairman of the board and Anthony A. Barnett was elected president.
- William A. Combs has been named president of Tymnet, Inc., a subsidiary of Tymshare, Inc.
- Joseph F. Callahan has been named president and member of the board of Interstate Business Services, Inc. and Donald E. Suman was named vice-chairman of the board.
- James G. Burke has been named president of Xebec Systems, Inc.
- Terence W. Randall has been named president and chief operating officer of Canada's Incoterm Computers and Terminals, Ltd.
- Frank D. Jakubik has been named vice-president of the eastern district of Honeywell Information Systems, responsible for the sales and installation of Honeywell's computer products.
- Steven J. Shamblott has been elected corporate vice-president of sales for Data 100 Corp.
- Evan Rowe has been appointed vice-president of marketing for MAI International Corp.
- Bernard E. Worne has been named vice-president of marketing for Signal Processing Systems, Inc.
- James P. Brown has been appointed corporate vice-president of Logicon, Inc.
- Michael E. Faherty has resigned as senior vice-president of finance and administration and as a director of Datapoint Corp.
- Tony Siembieda has been appointed vice-president of manufacturing operations for Amcomp, Inc.
- John Conroy has been appointed to the newly created position of vice-president of new program planning at Information Magnetics Corp.
- Roger Allen has joined Signature Technology, Inc. as senior vice-president.
- Julius Koppelman, group vice-president, will assume responsibility for RCA Alaska Communications, Inc., RCA American Communications, Inc. and RCA Global Communications, Inc.

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Wang Sees Introductions Doubling Performance Range

By Toni Wiseman
Of the CW Staff

TEWKSBURY, Mass. — Wang Laboratories, Inc. recently introduced some 20 products fitting into broad sections of its 2200 computer hardware and software product line.

These products roughly doubled the performance range and increased the depth of Wang small systems, Ned Chang, senior vice-president of marketing, told reporters at a news conference on the introductions.

Small computers appeal to users for a number of reasons.

"One small computer for one job makes that job more streamlined. It is therefore much more accessible than a large general-purpose computer that must deal with several jobs, using extra resources and overhead to do so," Chang explained.

In addition, a small computer fits easily within the appropriate operating unit that has line responsibility: "By easily, I mean in terms of planning, cost, staffing and, most importantly, accountability," he noted.

"This is in sharp contrast to the staff-oriented approach necessary on a large system, in which line management needs the cooperation and participation of staff functions to help achieve accountable goals," he said.

Machines Proliferating

Chang noted the proliferation of small computers — 2,000 systems shipped in 1972; 8,000 in 1974. "By the end of 1976, as IBM and others recognized and entered the market, that number has risen to over 55,000 installed," he said, adding Wang has about a 20% market share with 11,000 small business systems in place.

Applications are the key factor in determining future market growth, the Wang executive said. And applications for small business computers are multiplying at incredible rates.

"Manufacturing, distribution, transportation and communications markets have classically been the leaders in computer applications. But those markets have traditionally represented fewer than 20 major bread-and-butter applications using large mainframes," he said.

"Today, spurred by small computers, there are more than 100 routine applications being performed in these four major market sectors — and that number will double, and double again," he stated.

Banking, finance and insurance are likewise huge computer-using markets as is the government, education and medical sector.

"As we can see," Chang said, "the scope of the small computer business is demanding. It demands more than the ability to make a product. It requires total organizational dedication.

"That means many facets: for example, a large, user-oriented sales force; an organization that can plan a progression of products and industry programs sector by sector; software that is matched to the needs of the user; willingness to accept the responsibility for the system, rather than passing it to a third party; providing local service and maintenance wherever your equipment is located; building the manufacturing capability to produce cost-effective products," Chang stated.

Wang, he indicated, is strong in all these areas, with more than 2,000 individuals involved in software, a 450-man direct field engineering group and manufacturing capability for over 80% of the equipment sold.

Finally, Chang noted, the idea that small computers represent the best cost alternative for a user is being proven and accepted.

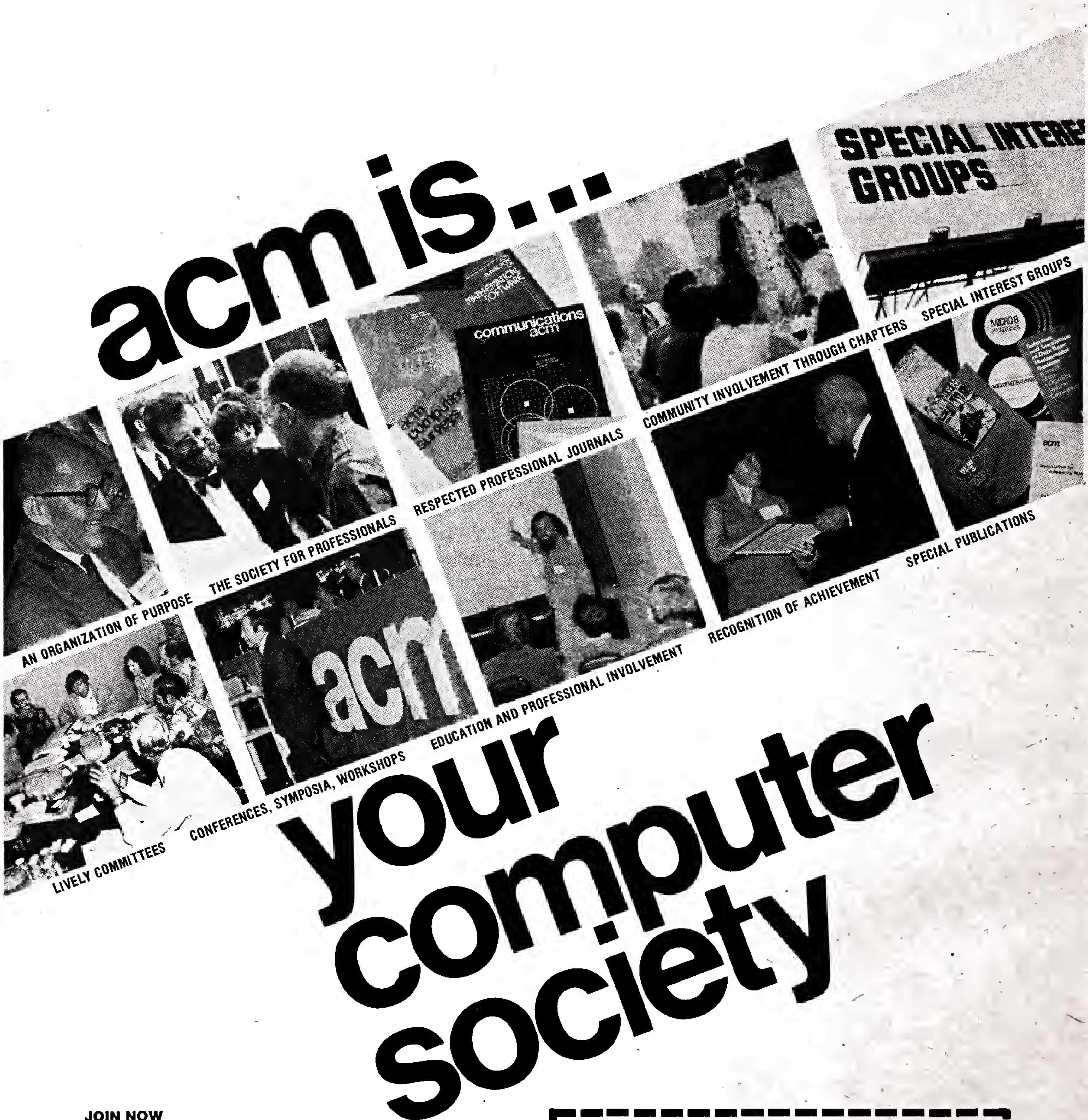
"Right now, for example, Wang has many users who are accomplishing many of the same jobs formerly done on large systems. The depreciation cost of a small business computer can be as low as $1 per hour, rather than $500 or $1,000. This is low enough to automate most clerical information-processing functions," he said.

"One dollar vs. one thousand. Immediate performance vs. delay. That's what the economics of small computers are all about," Chang observed.

Proxmire, Norris Set As Adapso Speakers

WASHINGTON, D.C. — Sen. William Proxmire, chairman of the Senate Banking Committee, and William Norris, chairman of Control Data Corp., will be the key speakers at the 46th Management Conference of the Association of Data Processing Service Organizations (Adapso) here April 18-20.

Proxmire will discuss the climate for small business, while Norris will address the general theme of the conference, "Responding to Change."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Microcosm

Based on SBC 80/20

Intel Has Unit for Distributed DP

SANTA CLARA, Calif. — The OEM Computer Systems Group of Intel Corp.'s Microcomputer Division has announced the System 80/20, a packaged microcomputer tailored specifically for distributed computing and multiprocessor control.

Based on the Intel SBC 80/20 single-board computer, the System 80/20 contains all memory and I/O hardware required for applications in industrial control, test and instrumentation systems, communications systems and on-line DP, Intel said.

The System 80/20 was designed for distributed and multiprocessing environments with features for real-time processing such as two programmable interval timers which may also be programmed as real-time clocks or event counters; and eight levels of priority interrupt which are under program control with the System 80/20, Intel said.

It also has a programmable communications interface designed for distributed processing systems.

The System 80/20 allows complete upward compatibility with the System 80/10 including the same instruction set and I/O addressing, the firm added.

A family of expansion boards is available for use with the System 80/20, the firm said.

The heart of the System 80/20 is the SBC 80/20, which contains the 8080A CPU, two internal timers/events counters, 2K bytes of read/write data memory in static random-access memories, up to 4K bytes of erasable programmable read-only memory or masked read-only memory and programmable priority interrupt control.

The 80/20 also features programmable I/O ports, programmable serial data communications interface with programmable bit/sec rate generator, multimaster bus arbitration logic and bus expansion drivers.

The System 80/20 costs $1,895; volume discounts are available, Intel said from 3065 Bowers Ave., Santa Clara, Calif. 95051.

Imsai IMM Handles 1M Byte of Memory

SAN LEANDRO, Calif. — Imsai Manufacturing Corp.'s Intelligent Memory Manager (IMM) is capable of handling 1M bytes of memory for microcomputers, according to the firm.

The IMM is a complete memory system for the Imsai 8080 and other S-100 bus computers and consists of the RAM-6, RAM-32 and RAM-65 memory boards and the IMM controller board, the firm said.

The system can be implemented in a variety of configurations ranging from a single-board, 16K-byte memory to a 17-board, 1M-byte system, Imsai said.

Larger multiprocessor systems can be implemented by using multiple Imsai mainframes and the Imsai shared memory facility, a spokesman added. Shared memory blocks can be up to 65K bytes and each processor can address up to 1M byte total of shared and local memory, he explained.

The IMM contains an 8048 microcomputer, an 8155 memory I/O timer chip and an 8255 read-only memory (ROM) I.O timer chip, for a total of 2K bytes of program and 320 bytes of data storage.

The memory modules are available in both assembled and kit form. The IMM ROM control costs $299 and $399 respectively; the IMM erasable programmable ROM control $499 and $699.

The 65K random-access memory (RAM) costs $2,599 and $3,899; the 32K RAM board $749 and $1,099 and the 16K RAM board $449 and $679 from Imsai at 14860 Wicks Blvd., San Leandro, Calif. 95477.

Board With 64K Fits Imsai S-100

SUNNYVALE, Calif. — A 64K random-access memory (RAM) board from Extensys Corp. meets Imsai S-100 interface specifications, including Altair and Imsai units, and allows memory expansion up to 1M byte, the firm said.

The 5-in. by 10-in. board contains 64K bytes and has hardware provision for bank switching to add over 1M bytes, Extensys said.

Cycle time is 500 nsec, with 400 nsec access time. Memory overlap protection is provided to ensure no conflict with existing memories, the firm said. All boards are fully assembled, tested and burned in.

The 64K RAM board costs $1,495; a 32K board costs $895 and a 48K board $1,195 from Extensys at Suite 3, 592 Weddell Drive, Sunnyvale, Calif. 94086.

Intel Adds +5V 16K-Bit Eprom, Reduces Prices on Two Memories

SANTA CLARA, Calif. — Intel Corp.'s Components Division has unveiled a 16K-bit erasable programmable read-only memory (Eprom) with a single +5V supply, designated the 2716, and reduced prices on its 8K Eprom, the 2708, and its 16K read-only memory (ROM), the 2316E, effective April 1.

The 2716, organized as 2K by 8 bits, is easier to use than previous designs in both the read and programming modes, Intel claimed.

For normal read operations, the device requires one +5V supply, which makes it more compatible with single-supply microprocessors; although it needs +26V in the programming mode, TTL level input, control and output levels have been implemented to simplify programming procedures, Intel added.

Access time is 450 nsec, the same as the 2708, but power dissipation in the read mode is 33% less, 525 mW. When not in the read mode, the unit can be deselected to operate at about 125 mW, or .007 mW/bit, the firm said.

The 2716 features single-location programming as well as single pulse programming, Intel said.

Intel also announced a Universal Programmable ROM Programming personality card, the UPP-816, with logic needed to program or read the 2716.

In lots of 100, the 2716 sells for $112. The 2708 now costs $32.75 and the 2316E now sells for $16.90 and has a nonrecurring mask charge of $1,100. Intel is at 3065 Bowers Ave., Santa Clara, Calif. 95051.

AMI Cuts Prices of S6800 Parts

SANTA CLARA, Calif. — American Microsystems, Inc. (AMI) has reduced prices 30% to 35% on its S6800 family of parts, slashed the price from $27.90 to $9.95 on its 4K erasable programmable read-only memory (Eprom) and also cut prices on its Microcomputer Development Center and the EVK series of prototyping boards.

The price of the AMI S6800 microprocessor, designed as a replacement for the Motorola M6800, is now $15 compared with $24 in quantities of 100 to 999.

Also in quantity, the S6820 peripheral interface adapter is now $6.30 compared with $10 previously. The S6810, a 128- by 8-bit random-access memory, is $3.75 compared with $5.25 and the S6831 2K by 8-bit read-only memory (ROM) is $11.75 compared with $17.

AMI's Microcomputer Development Center now costs $9,600 compared with $10,500 and includes an intelligent CRT terminal, dual floppies, a firmware debugger, file-oriented operating system, screen-oriented editor and an industry-standard assembler and loader, AMI said.

The prototyping boards are single-board computers ranging from a bare board at $75 to a fully assembled unit costing $715.

AMI is now selling separately 2K ROMs with either the Proto monitor or the Micro Assembler/Disassembler for $30 each. The vendor is at 3800 Homestead Road, Santa Clara, Calif. 95051.

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Fairchild Couplers Link Testers to 488 Bus

SAN JOSE, Calif. — A series of microprocessor-based interface couplers capable of linking test and measurement hardware to the IEEE 488 bus has been announced by Fairchild Camera and Instrument Corp.

Designated the Model 4880, the couplers allow programmable bench-top instrumentation hardware built within the last five years to be interconnected to IEEE 488-compatible terminals or programmable calculators without the use of special multipurpose interfaces, Fairchild said.

Prices range from $574 to $845 and the systems are in stock at the Instrumentation Unit, Fairchild Camera and Instrument Corp., 1725 Technology Drive, San Jose, Calif. 95110.

IEEE Sets Seminar

PARSIPPANY, N.J. — The Continuing Education Department of the Institute of Electrical and Electronics Engineers (IEEE) will give a two-day course on microprocessors May 13-14 at the Holiday Inn here.

The fee is $105 for IEEE members, $50 for student IEEE members and $140 for nonmembers. Additional information is available from Ted Barabutes, Westinghouse Electric Corp., 95 Orange St., Newark, N.J. 07101.

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James L. Severs
Manager, Staffing and Development

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Responding to unprecedented demand for our products and services, MCS has an urgent need to expand its West Coast staff with the following specialists:

SYSTEMS ANALYSTS
PROGRAMMERS
FIELD SERVICE TECHNICIANS
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Personnel with experience in minicomputers, peripherals and their applications in the burgeoning small business computer field. Locations initially in the Orange County and greater Los Angeles areas. Sales locations will be throughout the Western states.

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10-34

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Send resume to:

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Data Base Consultants/Educators

Nationally prominent firm in data base system consulting and training requires experienced individuals for selected temporary assignments. A minimum of eight years computing experinece, five years of system design, two years with a DBMS are required. Applicants must be able to support his/her resume with complete references.

Send resume to
CW Box 4986
797 Washington St.
Newton, Mass. 02160

Programmer/ Analyst

at four year private liberal arts college. Primary area of responsibility will be implementing administrative applications on B6700. COBOL required, DBMS experience desirable. Salary $12,000+ based on experience. Contact Dean Leonard Holder, Gettysburg College, Gettysburg, PA 17325.

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d p people ☺

Data Processing Professionals needed for important positions with New York City based Insurance company. If you have programming and/or systems experience in Insurance applications, this may be the career opportunity you are seeking!

Excellent starting salaries based upon experience, with interview, interim living expenses, relocation expenses and placement fees paid.

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New position to oversee recent merger of programming and operattions areas for a multi-campus, on-line environment. Responsible for 100 employees, $1,700,000 budget, 370/155 (OS/VS1). Immediate implementation of DBMS planned. Desirable experience includes five years of management, supervision of programming and operations, 370, DBMS, higher education. Advanced degree or equivalent preferred. Salary in mid to upper 20's; located on UMass/Amherst campus. Available immediately. Send resumes before May 31 to: Mr. P. Lawrence Hester, UMass/President's Office, One Washington Mall, Boston, MA. 02108. The University is an Equal Opportunity/Affirmative Action Employer.

PROGRAMMER ANALYST

Must have heavy NCR experience in COBOL and/or NEAT/3. Top salary commensurate with experience. Excellent personal and professional growth potential. Full company benefits including profit sharing and employee discount. Send resume including salary history to:

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Boeing Computer Services, Inc. is seeking specialists for a broad spectrum of important computer assignments principally in Seattle, Washington. Experienced computer professionals are needed in the following areas:

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REAL TIME AVIONICS

- **Executive Software Evaluation.**
- **Mission Software (In JOVIAL or CMS-2 using MIL STD 1553 buss).**
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MINI-COMPUTER SYSTEMS

- **Mini-computer application analysis, system design and software analysis for data reduction/acquisition, data entry, data base management and output processing.**
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DATA BASE DESIGN

The design, development and implementation of physical and logical data base applications using IMS, IDMS, System 2000, CICS, or distributed processing.

PROGRAMMERS/ANALYSTS

To develop, implement and maintain information and data systems using COBOL, FORTRAN, or assembly OS/JCL programming on IBM 360/370 or CDC 660 hardware.

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- **Custom Programmers** with 1-2 years experience using COBOL or PL-1 in a business environment.
- **Systems Consultants** with experience in business application design, commercial project management, and related DP consulting experience.

Send your detailed résumé now to The Boeing Company, P.O. Box 3707-JDG, Seattle, WA 98124.

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BCS BOEING COMPUTER SERVICES, INC.

SYSTEMS PROGRAMMER

Consumers Power Company has opening for Systems Programmers with a thorough knowledge of OS/VS Internals and assembler. Experience with OS/MVT-OS/VSL - HASP IV is desirable. Salary commensurate with experience.

Please send resume in confidence to:
Professional Employment
CONSUMERS POWER COMPANY
1945 W. Parnall Road
Jackson, Michigan 49201
An Equal Opportunity Employer M/F

GLOBE- UNION Inc., a leading international manufacturer of batteries and electronics is seeking 2 professionals for its Systems Development Staff. The positions are available in Milwaukee where our Corporate and Divisional Headquarters are located.

PROGRAMMER ANALYST

Minimum 2 years of COBOL experience. Knowledge of IDS and manufacturing background helpful.

SYSTEMS ANALYST

Prefer degree or equivalent experience. Background should include 3-6 years of manufacturing systems. Must be a good communicator, and be able to "take charge". Proficiency in COBOL and knowledge of IDS would be helpful.

These positions provide involvement with Honeywell large scale systems, remote batch teleprocessing, and minicomputers in a large network.

Excellent fringes and a salary commensurate with experience. Send resume with salary history to: MR. R. RENDL.

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Project Leader
Systems Development

Our client, a progressive NYSE-listed company located in the Great Lakes-mideast area, is seeking a well-rounded Project Leader or Lead Analyst who is ready to play a major role in MIS expansion program.

REQUIREMENTS:

4-5 years systems and programming experience in both a batch & real-time IBM 370 environment. Familiarity with broad industrial applications and terminal-oriented communications systems required. College degree preferred.

RESPONSIBILITIES:

To lead the design & implementation of manufacturing, financial & distribution systems. Will have direct interface with users.

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1-3 years' experience in the design through implementation of large scale business systems. You'll have responsibility in the achievement of practical solution to vital corporate system projects.

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Challenging positions involving applications design, require 1-3 years' ANS COBOL on variety of large scale business systems.

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SALES

We are looking for that one, right sales professional to sell our well-established SYSTEMS III products to end-users as well as to select, support and assist area dealers. For that one, right individual, this is a truly unique and unusual opportunity for career and financial growth. To be considered, applicants must have prior sales/marketing experience in the mini-computer and/or small computer business systems marketplace. Compensation will include base salary plus incentives, a company car and a liberal employee benefit package. Send detailed resume including current earnings to our Employment Manager.

Local Interviews

CW Box 4982
797 Washington Street
Newton, Mass. 02160
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communications software development

SAN FRANCISCO PENINSULA

Intel Corporation, the world leader in microprocessor technology, is seeking experienced software professionals for our data communications group. This is your opportunity to play a key role in the design and development of sophisticated multi-processor-based communications systems.

You will work closely with hardware development and use the latest microprocessor components and peripherals. To qualify, you should have experience in one or more of these areas:

- Data communications and networks
- Real-time operating systems and modern operating system design theory
- VTAM, TCAM, BTAM, etc.

Experience with high-level system implementation languages and the design of operating systems and systems software for micro- or mini-computers plus an MS or PhD in computer science or related field desirable.

For immediate and confidential consideration, please send your resume with salary history to Intel Memory Systems, 1302 N. Mathilda Ave., Sunnyvale, CA 94086. An Equal Opportunity Employer M/F.

MEMORY
SYSTEMS

intel

Fourteen of our top twenty-five Sales Engineers never sold computers before they came to Data General.

They were Software Support Engineers, Customer Engineers, Systems Programmers, Hardware Designers...you name it.

The point is this: You can stick to your job for the next 18 months, or become a Sales Engineer at Data General, sell computers for a year—and you'll make the same money. Or more. You already have the technical credentials and, if you enjoy dealing with people and working in a competitive environment, there's no limit to what you can earn as a Sales Engineer at Data General.

We give you more of what you need to be successful: computers, peripherals, technology, reputation, position—over 39,000 Data General computers have been sold and installed in 33 countries around the world. Stay where you are, or move up to Data General—it's your future.

Computer Sales Engineers

We require solid technical background in mainframes, minis or systems—plus the ability to open up new OEM and end user accounts is a must.

New positions are available in the following locations: Albuquerque, Phoenix, Denver, Salt Lake City, Portland, Seattle, Richland, WA, Idaho, San Diego, Los Angeles, Santa Barbara, Fresno, Palo Alto, San Francisco Bay area and Sacramento.

We are also looking for Systems Engineers and have immediate openings in Santa Ana and San Diego.

To apply for a position call Terri Johnson collect at (408) 739-9200 and send your resume to her at Data General Corp., 408 N. Mathilda Ave., Sunnyvale, CA 94086.

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SAN FRANCISCO
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The position requires top management skills in an advanced systems development environment. Experience in the management of Comprehensive Multiple Banking Systems is required.

This V.P. level assignment exists in a sophisticated Multiple 370 MVS installation utilizing IMS DB/DC with a heavy T.P. involvement. Salary is to $45K.

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Attractive salaries, incentives, benefits, plus a hospitable location where everything goes further, including you—here or elsewhere within the Tymshare organization nationally! Send your confidential resume to or CALL COLLECT:

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We are seeking experienced professionals to join us and be a part of our rapid expansion in the booming mini-computer industry. There's never been a better time to consider the outstanding career opportunities with MODCOMP and the good life in sunny Ft. Lauderdale, Florida.

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To manage the operation of the computer center utilized by our Software Development Department. This individual must have experience in budgeting and scheduling as well as management of closed shop and key punch activities.

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Mid and senior levels to participate in the development of standard software products for the MODCOMP II and IV product lines in the areas of operating systems, networks, communications software, QA and maintenance.

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To design, develop, check-out, document diagnostic programs for communications and process control applications for CPU memory and peripheral systems.

We offer competitive salaries, substantial fringe benefits and an outstanding opportunity for career growth and advancement. For further information call or send resume including salary history to:

Mr. Robert M. Coyner
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Data Processing Division
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Portland, Oregon 97205
(503) 224-6860

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(201) 335-8700

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Home Federal Savings and Loan Association is seeking an individual with a minimum of 2 years programming experience with a Burroughs minimum system. Experience in a financial setting is preferred.

Salary commensurate with experience. Please rush your resume in confidence to:

Home Federal Savings
& Loan Association
Personnel Office
P.O. Box 2871
Tucson, AZ 85702
equal opportunity employer m/f

Banking
Data Processing

If you are interested in relocating to the beautiful Pacific Northwest, we currently have several excellent positions for EDP professionals with banking systems or programming experinece. Send resume in confidence to Jim Morris, Houser Martin, Morris & Associates, 1621 114th S.E., Suite 219, Bellevue, WA. 98004.

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21 SHOESTRING START-AT-HOME COMPUTER BUSINESSES

113 page research report uncovers areas never published, plus hundreds of how-to-do-it ideas on moonlighting, starting up, image building, bidding, contracts, failure signals, and much more. A superior career planning tool. $12.00 (check, Mastercharge, Bankamericard) Guaranteed Refundable,, to DATASEARCH INC., Suite 108, 730 Waukegan Rd., Dept. G, Deerfield, IL 60015.

DATA PROCESSING PROFESSIONALS

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There's an oppt'y for you in the PACIFIC NORTHWEST.

Current openings for programmers, prog/analysts & systems analysts: Banks, S&L's, Mf'g, Retail, Gen'l business applications. BAL, COBOL-ANSI, PL-1.

EDP is our exclusive field. We can cover the market for you. All fees & relocation paid. Call Don Harris, Mgr. (503) 224-9575, or send resume.
CompuSearch, 811 S.W. 6th Portland, OR 97204

SYSTEMS SOFTWARE PROGRAMMER

To do maintenance and development work on our FORTRAN compilers. One of these is currently on the CDC7600 and is being slowly upgraded to the FORTRAN 77 specification. Another will be acquired with the delivery of the CRAY-1 computer system. Additional compilers will be procured as our proposed front end system is developed late in 1977 and 1978. May be responsible for maintenance of large portions of a software system. Designs, codes, and performs check out of software system elements needed to achieve specific objectives sought by an overall system software design. Candidate's general programming experience should emphasize the following: design, formulation and implementation of complex computer system software programs. In addition, requirements include: M.S. in computer science, math, physics or equivalent, 5-8 years as a systems programmer with the last 2-3 years dedicated to compiler maintenance and development. Anticipated hiring salary range: $16,800-20,000/year. Qualified applicants should request an application from the Personnel Office.

NATIONAL CENTER FOR ATMOSPHERIC RESEARCH

P.O. Box 3000 Boulder, Colorado 80307

Minority and female applicants are encouraged to apply and identify themselves.

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Data Processing

SYSTEMS ANALYST

To sustain our continuing success as we grow with the energy industries, we seek experienced Systems Analysts who will effectively develop and implement manufacturing information systems. Primary responsibilities of this growth opportunity position includes evaluations of existing computer based systems; coordination of new systems development; training; equipment and software analysis; and project team supervision.

Successful candidates will have 2 to 5 years analysis and supervisory experience with a demonstrated ability to interface effectively with users. A background in manufacturing is also required.

Proven achievers should send resumes and salary requirements to:

CW Box 4985
797 Washington St.
Newton, Mass. 02160
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RESEARCH TEAM LEADER
COMPUTER ARCHITECTURE

Foxboro is an industry leader in the design and development of microprocessors for process control systems. This point-of-departure opportunity requires an individual with proven technical leadership capability.

For this position we are seeking a senior engineer who has had direct experience in the design of computers, memories and I/O subsystems. This is a senior level position in our Research Department where innovative skills are of the utmost importance. This individual will be responsible for research and prototype development of new digital computers using the latest LSI technologies. These computers will be applied in future process control systems where the emphasis is on real-time, reliability and economy and will be small and highly distributed. You will be required to work closely with software designers to achieve optimal hardware/software tradeoffs. BS or advanced degree in EE or Computer Science is required plus 5 to 15 years of industrial experience with at least the last 3 years in computer architecture.

Send resume, including salary history to Mike Walsh, Dept. 411-CW, The Foxboro Company, 38 Neponset Ave., Foxboro, MA 02035. Foxboro is an equal opportunity employer, M/F.

FOXBORO

MBA

Dynamic Southwestern Energy Company seeking MBA with two to five years of business applications experience.
This is a responsible project leader position with exceptional growth Potential. Contact: Carter Knapp, Manager of DP Recruiting • STM Executive Recruiters • 350 South 400 East • Salt Lake City, Utah 84111 • (801) 531-6500.

STM EXECUTIVE RECRUITERS

Morrison Incorporated has an immediate opening for a SYSTEMS PROGRAMMER IBM 370/138

Position requires re-locating to Mobile, Alabama, 2—5 years systems experience in DOS/VS with knowledge of the internals of DOS/VS, CICS and VSAM. BAL also required. Degree preferred.

Responsibilities include maintenance of the operating system software, problem resolution, performance analysis, and standards development.

Salary commensurate with experience. Reply in confidence to Mr. Frank Head, Director of Recruiting.

Morrison Incorporated
Human Resources Department
First National Bank Building
P.O. Box 2608
Mobile, Alabama 36625

NAVY SHIPBOARD SYSTEMS

AQUIDNECK DATA CORPORATION, an innovative new software consulting firm located in Middletown, Rhode Island, is hiring computer software specialists to fulfill commitments in Navy on-line systems for shipboard applications. Openings exist for qualfied professionals in system design, programming, documentation, and management.

THE COMPANY:

The company is founded on a philosophy which includes employee ownership and control; bonuses for excellent achievement; profit sharing; Management by Objectives; and an open, professional atmosphere.

THE AREA:

Middletown, Rhode Island is located next to historic Newport, and is convenient to both the Providence and Boston metropolitan areas. It is pleasantly situated on the ocean and in peaceful rural surroundings. It offers a diversification of both winter and summer recreational activities.

THE WORK:

AQUIDNECK DATA CORPORATION's business is based on identifying with the customer and solving his problems. For this reason, employees need excellent communication skills and an ability to function effectively in a team. There are opportunities for leadership and management, as well as technical achievement in the following areas:

• SYSTEMS ANALYSIS

Systems Analysts at both the junior and senior levels are needed for software development projects. Required technical skills include computer program design, coding, checkout, documentation, and system integration. Experience is desired in AN/UYK-7 programming, particularly in on-line combat systems applications. Experience with CMS-2 and the AN/UYK-20 is also helpful.

• SYSTEM TEST ENGINEERS

Openings exist at senior level positions for consulting on the TRIDENT CSS integration/certification test'ng efforts. Requires knowledge of TRIDENT CCS and preferably experience in combat system testing.

• ADVANCED SYSTEMS ANALYSIS

Positions are open for complex shipboard operational system design for mid-1980's submarines. Requires in-depth knowledge of state-of-the-art software architecture and development techniques. Prefer experience with on-line combat systems.

• DOCUMENTATION

Senior level positions are open for candidates with technical writing experience in computer software documentation. Assembler language programming experience, knowledge of Navy combat systems, or systems analysis background is desired. Individuals with backgounds as Navy commanding officers on submarines are also being hired to develop documentation.

• SOFTWARE CONFIGURATION MANAGEMENT

Individuals with experience in software configuration management and control of large scale software products are being hired. Recent experience with Navy combat systems and project management is desired.

If you are looking for an opportunity for personal growth, send a copy of your resume to: Ms. Jan Lauver

Aquidneck Data Corp.
Box 99 • Middlotown, Rhode Island • 02840
an equal opportunity employer M/F

COMPUTER PROGRAMMERS SYSTEMS ANALYSTS

Challenging opportunities with
Western Union, an innovator in computer systems.

3 years experience in real time computer systems. Experience should include system specifications and procedures development as well as systems diagnostic/monitoring procedures and definition of operational interfaces for DIGITAL EXCHANGE SYSTEM. Circuit switch experience is desirable.

SYSTEMS ENGINEER/ANALYST

College graduate, 3-5 years experience in defining communication systems requirements and/or performing analysis of complex computer switching systems.

SYSTEMS/PROGRAMMER ANALYST

3-5 years experience in system design programming and implementation using CICS, COBOL, 370 hardware and OS/VS operating systems. Experience with JCL and debugging desired.

COMPUTER PROGRAMMER

College grad, minimum 1 year experience on UNIVAC computers with demonstrated programming achievement in one of the following areas: Real-time systems, communications applications, switching systems.

Salaries will be commensurate with academic and professional accomplishments. Please submit resume including complete salary history to: *Mr. R.I. Freifeld, Director of Professional Employment, CW 43*

WESTERN UNION TELEGRAPH COMPANY
One Lake Street, Upper Saddle River, N.J. 07458
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western union

DATA BASE ADMINISTRATOR Univ. of Kansas (Lawrence Campus), Office of Information Systems, is seeking a Data Base Administrator to supervise planning, development, and implementation activities for integrated Data Base Management Information systems. Opportunity to join a growing information systems org. utilizing IBM 370/148 with VS1, IMS/DB, CICS, MARK IV, and a teleprocessing/RJE network. A challenging position with a prominent University for individual possessing blend of excellent technical and application IMS experience. New computer facilitity under construction. Excellent professional growth and career opportunities.

Required exp. includes college degree (pref. in area of data proc., comp. sci., or related field), a min. of 2 yrs. IMS experience, 2 yrs. data base admin. (preferred), 4 yrs. data processing, knowledge of IMS utilities and Data Dictionary, and exp. with IMS system design.

Interested, qualified professionals requested to send detailed resume including salary history and requirements to: Jerry R. Magnuson, University of Kansas, Room 323 Carruth-O'Leary Hall, Box 2034, Lawrence, Kansas 66045.
Application deadline: May 1, 1977
AN EQUAL OPPORTUNITY EMPLOYER - WOMEN, MINORITIES, AND PERSONS WITH DISABILITIES ENCOURAGED TO APPLY.

PROGRAMMER ANALYST

2-3 years programming and systems experience using COBOL and BAL. Excellent starting salary and fringe benefits.
Apply: Eastern Kentucky Educational Development Corporation, P.O. 1269, 925 Winchester Avenue, Ashland, Kentucky 41101.
Deadline Apirl 29, 1977.

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HP 3000-HP 1000 IMAGE KSAM query DEL	$25K
SOFTWARE Support-on line telecommun	$25K
CICS ANAL-programming req	$23-27K
RAMIS/TSO-convert In-house	$23-25K
SOFTWARE Systems-VM CP & CMS-4 day wk	$23-25K
DATA General Eclipse-syst cnslt	$19-25K
BANKING Institut-DOS COBOL Mark IV	$19-22K
PROGRAMMER-actuarial COBOL IMS	$18.5K
RETAIL Systems-EDP auditor	$18K
BANKING Methods-EDP cost analyst	$16K

Bill Borrelli (212) 349-3610
William Harris Assoc
150 Broadway, agency NY 10038

MARKETING PROFESSIONALS

Wouldn't you like to be a member of UCC's highly successful Scientific and Engineering Division's expanding Marketing team . . . and enjoy living in Dallas, Texas, the Hub of the Sunbelt . . .

WHERE

- The 6000 Services Plant is being doubled this year to meet demands
- The broad range of hardware, software, and application services provide solutions to almost every imaginable data collection and processing requirement
- New capabilities and applications are constantly added to the 1108 service to extend the product line
- There continues to be significant career opportunities in our small and personable environment.

THEN

- We have the following innvoative and challenging marketing positions available:

MARKETING MANAER

Here's a great opportunity to apply your manufacturing marketing skills to the metals industry. This position will entail a variety of interesting and challenging responsibilities which include managing a couple of product managers, managing a budget; product effectiveness against plan; and short and long term product planning. You will report directly to the Director of Marketing.

PRODUCT MANAGER N/C

If you have been a senior APT programmer or are selling N/C services or software, here's a great opportunity to break out of a technical or sales role. Some of the interesting responsibilities will include sales leads, market opportunity identification, vendor interface, product announcements, advertising, pricing, product seminars, and product design.

This is your opportunity to join UCC's successful team. Some of our key members are Lee Foster, Los Angeles (213) 322-3093; Don Swanson, Chicago (312) 368-0995; and Ronnie Barnes, Dallas (214) 655-8770. Feel free to give them a call.

PRODUCT MANAGERS

Univac 1108 and CDC 6600

If you are a successful salesperson in remote computing services or an aspiring assistant product manager, here are two excellent opportunities to assume full product responsibilities for either UNIVAC 1108 or CDC 6600. Some of the challenging responsibilities will include product design, product announcement, product seminars, pricing, advertising, market opportunity indentification, vendor interface, and saels leads.

SENIOR SALES REPRESENTATIVE

If you have an excellent track record in data processing sales (preferably in remote computing or time sharing), here's a rare opportunity to handle UCC's major multiple clients throughout the country.

IN ADDITION, we have immediate openings in Dallas for the following technical individuals:

SENIOR PROGRAMMERS ANALYSTS - Opportunities for ambitious computing professionals to join UCC's expanding commercial/software area. Candidates will assume responsibilities for development and maintenance programming for SCOPE and NOS/BE operating system on CDC 6600 and CYBER equipment.

N/C PROGRAMMERS - Opportunities for manufacturing computing professional to join UCC's excellent Numeric Control Applications and Services team. Must have three years Numeric Control programming experience using APT, Compact, or another APT-related language.

If you are a true professional and are interested in teaming up with UCC, send your resume in confidence to: G.D. Afseth, P.O. Box 47911, Dallas, TX 75247 . . . or call (214) 688-7179 or 655-8888.

UCC
UNIVERSITY COMPUTING COMPANY
AN EQUAL OPPORTUNITY EMPLOYER M/F

SYSTEMS SOFTWARE

Computer Associates is a dynamic and growing software company concentrating on the development of proprietary systems packages.

We are seeking individuals residing in the greater New York area who are experienced in IBM operating systems and have heavy ASSEMBLER backgrounds. Excellent starting salary and full benefits provided.

Join the dynamic Computer Associates software team today!

Send resume to Mr. Russell Artzt, Computer Associates, 655 Madison Avenue, New York, N.Y. 10021, or call collect: (212) 355-3333.

Data Processing

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Here's your opportunity to be instrumental in the development of new systems to support large scale FINANCIAL, OPERATIONAL, ENGINEERING and RESERVATION functions of a nationwide corporation. Openings for senior and mid-level personnel are now available. Join us and grow.

Real Time Communications Programmers

Requires on-line experience for systems development in Assembler language, maintenance, program testing, and the installation of CDC and PDP equipment.

Programmer & Programmer/Analyst

Requires extensive experience in the design and implementation of applications in an IBM OS/MVT or VS environment using MARK IV, COBOL, FORTRAN. TSO, IMS, IBM 3790 programming helpful.

Operations Production Technical Support

Requires 1-2 years experience in coding and debugging IBM 360/370 OS JCL, analysis and resolution of production abends, OS utilities, operations documentation review and turnover. Knowledge of MVS, TSO and hands-on computer operations helpful.

Systems Programmer

Requires experience in such areas as: MVS, JES II, TSO/TCAM, VTAM/NCP, VSAM, IMS, and multiple languages, including ALC, COBOL, FORTRAN OR MARK IV. Must possess ability to provide fast problem resolution, analyze and interpret performance data, recommend and develop standards.

We offer excellent salaries, benefits and growth opportunitiess. Send resume including salary history in strict confidence to: J.R. Brune, Dept. 002.

Amtrak

AMTRAK
955 L'Enfant Plaza SW
Washington, D.C. 20024

An Equal Opportunity Employer M/F

PROGRAMMER/ ANALYSTS

NCR Data Processing Division has immediate openings for Programmer Analysts in:

- MIS Applications Programmer
- Software Development
- Firmware
- Diagnostic Programming
- O/S Project Lead

(Design/implementation of multi-program O/S in a high level language. Experience desired in data base or telecommunications, distributed processing, virtual machine, time sharing).

Employees will enjoy excellent salary and top working conditions with a commercial employer. Fully paid life, hospital and medical plan for employees and dependents.

To arrange an appointment, please send resume immediately including salary history, training and experience to the Professional Placement Office at the address below.

NCR

Data Processing Division
16575 W. Bernardo Drive
San Diego, Calif. 92127

An Equal Opportunity Employer

GECOS

If you are interested in relocating to the beautiful Pacific Northwest, we currently have an excellent position for an EDP professional with GECOS internals experience.

Data Base Admin . . . to 30K

Contact Jim Morris or Bill Parfitt. Houser, Martin, Morris and Associates, 1621 114th S.E., Suite 219, Bellevue, WA 98004 (206) 455-9600.

RSTS/E PROGRAMMERS

We are in the midst of expanding our D.P. staff and are seeking experienced Basic+ programmers. We need self-reliant individuals with 1-4 years programming experience using the RSTS/E operating system preferably in a commercial environment. Please send your resume including salary history and requirements in confidence to:

MELVIN SIMON & ASSOCIATES, INC.

Data Processing Dept.
1712 N. Meridian St.
Indianapolis, Indiana 46202
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Systems Programmer Eastern Virginia

We have a challenging opportunity for an aggressive systems programmer who is looking for more than just "Bits and Bytes" problem-solving. The successful candidate will possess the following:

- Systems generation-performance tuning of DOS/VS, CICS/VS and DBOMP
- Demonstrable written and oral communication skills

If you have these qualifications and are interested in professional growth, send resume and salary history to CW Box 4974, 797 Washington St., Newton, Mass. 02160.

All replies will be handled with strict confidence.

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Openings now exist thruout the Eastern U.S. with all recruitment and relocation fees paid. For details contact Mr. Harris ar

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BMS Computer is looking for independent software agents to represent the CIMS job accounting & system performance reporting product. The CIMS product received an award of merit from Datapro. Openings available in most U.S. cities & Europe. For further information, please contact:

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Programmer

DEC 11/70
Supporting, Interactive Graphic Systems

Major engineering consultant firm seeks individual with RSX-11 Macro & Fortran exp, and be of proven quality. Environment is new and professional and offers rapid advancement opportunities.

Send resume including salary reqmts in strict confidence to:

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SYSKA & HENNESSY
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EEO M/F

Data Processing Manager

Home Federal Savings and Loan Association has an immediate opening for a Data Processing Manager at their headquarters in Tucson, Arizona. The ideal candidate will have proven experience as a data processing manager which includes business development for initiating and servicing accounts, and supervisory experience in areas of programming and operations. Job experience should be from savings and loan or banking environments. Burroughs 4700 on-line system is in present use.

Should you wish to become a member of our dynamic management team, please submit your resume including salary history in strict confidence to:

Home Federal Savings & Loan Association
Personnel Office
P.O. Box 2871
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LOUIS BERGER INTERNATIONAL INC. a U.S. company with world-wide activities in Engineering, Planning and Economic Development offers career opportunities for experienced:

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PDP11 COBOL RTS-E
Timesharing-For Nigeria

IMS SYSTEMS ANALYST
Internal & External Experience Required

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Programmer

There's A Better Future For You At Fluor

Fluor Corporation, a dynamic and internationally respected leader in the engineering and construction field, currently has key openings to challenge top notch Systems Programmers for CDC Cyber 170's Systems with a medium to heavy SCOPE or NOS/BE experience.

Successful candidates must possess:

- A minimum of 2 years' experience maintaining a CDC SCOPE 3.4, 3.3 or NOS/BE operating system
- Proficiency with CP and PP compass
- Experience in analyzing dumps from system failures and generating or locating corrective code
- Familiarity with basic internals of SCOPE or INTERCOM.

The individuals selected must be able to maintain a stable version of NOS/BE at current PSR levels. Additional duties will include installation of local modifications, evaluation of system performance and user consultation.

Our employees enjoy excellent benefits including profit sharing and savings investment program. Positions are located in our new innovatively designed facility in the Newport Beach area.

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PROGRAMMER

We are a leading manufacturer of transportation equipment. Due to a promotion, we seek an experienced Programmer for our home office Manufacturing Systems Department.

This excellent opportunity requires two to five years of EDP experience, proficiency in OS, ANSI-COBOL and some exposure to manufacturing applications. Experience with BOMP, CFMS or Data Base is preferred.

We offer an outstanding salary and benefits program, plus an opportunity for personal and professional growth working in a large scale (dual 370/158S) environment. Please send resume including salary history in confidence to:

Mr. Mal Wadland - Dept. 12

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If you were promised a place in the sun and it's still raining on your parade, it's time to consider NCR in Wichita. Our only promise is that if you have what it takes, it will take you places.

ALL POSITIONS REQUIRE INDIVIDUALS WITH A MINIMUM OF 2 YEARS EXPERIENCE. If you have it and can't benefit by it, send us your resume. If you don't, save your postage and our processing time.

SYSTEMS SOFTWARE PROGRAMMERS

COMPILER DESIGNERS/PROGRAMMERS
Responsible as a team member for design, development, documentation, testing and enhancing of language processors (Compilers). Requires knowledge of high-level languages (COBOL and/or RPG preferred) and assembler type languages. B.S. in Computer Science and 2-5 years Compiler related work experience desired.

DIAGNOSTIC DESIGN & PROGRAMMING
Design, modification, and support of diagnostic programs to provide self testing on new mini/micro processor based hardware systems. BSEE or BSCS plus assembler language programming experience. Logic analysis and testing desirable. Minimum of 2 to 5 years experience desirable.

MINICOMPUTER OPERATING SYSTEMS
Responsbile as a team member for the design, implementation, and testing of an interactive general purpose operating system to support cobol applications and utilities written in assembly languages. It requires a BS in Computer Science and a minimum of 1 to 5 years experience in assembly languages.

SYSTEMS HARDWARE DESIGN

- Real-time Architectures and Development with experience with on-line minicomputer applications.
- Network Design and Communications Control for Distributed Processing Systems.
- Minicomputer Hardware/Software Design Trade-off.
- Terminal and Peripheral Interface Design.
- 2 to 5 years experience preferred.

Send resume including salary history and reference information to: Max Anderson, Professional Placement, Dept. CN, 3718 N. Rock Road, Wichita, Kansas 67226.

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NCR

Data Processing Division - Wichita

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2820 N. Stanton
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SENIOR PROGRAMMER/ANALYST

Small but growing agricultural equipment manufacturer, located in small pleasant community requires a senior programmer/analyst. Ideal candidate would have experience in manufacturing applications, with a system 3, utilizing RPGII, send resume with employment and salary history to:

GT®

Personnel Director
Gilmore & Tatge Mfg. Co., Inc.
Clay Center, Kansas 67432

SONOMA COUNTY JUNIOR COLLEGE DISTRICT SANTA ROSA JR. COLLEGE DATA PROCESSING DIRECTOR

The Sonoma County Junior College District, a comprehensive open-door community college, is seeking a director who will be responsible for all phases of the computer center operation, to include administrative and instructional uses.

Requirements: Candidates must have a successful background and experinece supervising all phases of data processing.
Salary Range: $1,719-2,090 per month, depending upon experience, plus liberal fringe benefit package.
Deadline: Application materials must be received by the District by May 11, 1977. Expressions of interest should include comprehensive resumes and transcripts.
Contact: Earl P. Johnson, Assistant to the President, Santa Rosa Junior College, 1501 Mendocino Avenue, Santa Rosa, CA 95401, (707) 527-4431

Equal Opportunity/Affirmative Action Employer

DATA PROCESSING SYSTEMS PROFESSIONALS

Overseas positions available for the following qualified personnel:
Systems Programmers: MBS, IMS internals experience & proven communications ability.
Programmers/Analysts: Proven experience in systems analysis. On-line IMS, data base design experience. Knowledge of COBOL & ASM.
Data Base Administrator: 4-5 yrs. experience in data base design, logical structures with VSAM experience & experience with data dictionary.
Also require technical writers and operations consultants. These positions are open in Tehran, Iran. Excellent salaries/available plus living allowance for qualified personnel. Please forward complete resume with salary requirements in complete confidence to: Anthony Fellicelli, 1960 Richard St., Aurora, IL.

UNIVAC PROFESSIONALS ONLY

If you are a programmer programmer/analyst, systems analyst, or EDP professional and would like the most individualized job search offered in the data processing field today on a local or national level, forward your resume, with present salary and geographical preference, in strict confidence, to:

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Hartford, Conn. 06101

MANAGEMENT OPPORTUNITY SAN FRANCISCO

Our client requires a talented management-level professional for a challenging opportunity in the following area:

DIRECTOR OF SYSTEM DEVELOPMENT

Requires strong management and organizational planning abilities with a strong knowledge of banking and systems development. Must be currently managing a large systems development group in an advanced technical enviornment (i.e., 158, 168, MVS, IMS DB/DC, Cobol). A knowledge of advanced development methodology is essential (i.e., Code Analysis, Cause and Effect Graphing, Top Down Structural Design, etc). This is an integrated IMS data base/data communications environment. You will have total responsibility for Asset and Investment Systems, International Banking, Retail Inquiry Systems, Liability Systems, Bank Operations Support and Branch Automation with 7 first line managers reporting directly to you. You will be the primary interface to using executive management.

Salary commensurate with experience. Relocation paid by client company.

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We're busy and need your expertise to sustain our leadership in engineering field. Contact us at once if you qualify.

Systems Design Engineers/ Project Leaders

Help us expand state-of-the-art in such areas as REAL TIME, INTERACTIVE COMPUTER - Controlled and COLLECTION PROCESSING systems. Successful candidates will have a BS/MS, EE, CS or equivalent experience with 3-10 years' experience in 2 or more of the following areas: *Pattern Recognition; *Text Processing; *Decision Analysis; *Data Base Structures; *Artificial Intelligence; *Distributed Processing; *Mathematical Programming; *Advanced Digital Processing Concepts for FFT.

Data Base Management Software Specialists

We want to hear from you if you are seeking opportunity for design and/or project management tasks, potential for overseas assignment and have 3-10 years' experience in the following: *Data Base Management; *Software Design and Implementation for an Analysis and Reporting System. Computer systems include PDP 11/70, Data Management Systems IDMS or DBMS 11, RSX-11D and IAS.

Signal Processing Systems Program Manager

Emphasis on the following - overall responsibility for signal processing. Duties include project responsibilities for signal processing projects, Government Marketing activity, including exploratory development programs, advanced development projects and engineering development systems. Requires BS/MS EE with MBA desirable plus 8-15 years' experience.

Interested? In return for your talents, we'll give you an excellent salary, great benefits package including tuition reimbursement, free medical and dental insurance, relocation assistnce and a congenial yet professional atmosphere. Please send resume, in confidence, to

Dept. CW-96
P.O. Box 188
Mountain View, Calif. 94042.

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GTE SYLVANIA

PROGRAMMERS ANALYSTS

Consumers Power Company in Jackson, Michigan offers opportunities for programmers and analysts in systems development and maintenance. Experience with IBM 360/370 OS and COBOL, FORTRAN or PL/1 helpful. Salary commensurate with experience.

Please send resume in confidence to:

Professional Employment
CONSUMER POWER COMPANY
1945 W. Parnall Road
Jackson, Michigan 49201
An Equal Opportunity Employer M/F

BOEING

Software and Computing Systems Engineers

The Boeing Company in Seattle, Washington has immediate requirements for experienced software and computing systems engineers. Assignments will be in command and control, avionics and related product applications and require experience in: Software/Computing Systems Design Analysis; Real-Time Operational Software Development; Support Software Design and Development or Software/Computer System Quality Assurance.

Candidates must have an appropriate BS degree or higher and be U.S. citizens.

Attractive salary, fringe benefits and moving allowances will be offered qualified candidates. You will find living is a pleasure in the unspoiled Northwest with its many recreational and sports activities and relaxed life-styles.

Please send your detailed résumé to The Boeing Company, P.O. Box 3707-LBK, Seattle, WA 98124.

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PROGRAMMER/ANALYSTS

$14,000 - $20,000

Leading Fortune 500 company is beginning the development and implementation of a nationwide on-line teleprocessing system. This project will require adding 10 Programmer/Analysts to the current staff over the next few weeks, conversion to MVS, and the implementation of IMS. Career paths for Programmer/Analysts lead to technical SOFTWARE DEVELOPMENT or SENIOR APPLICATIONS ANALYSTS depending upon individuals interests.

To qualify for these exceptional opportunities, an individual should have a minimum of two years 370 COBOL experience.
For more information call or send resume to:

CHRISTOPHER AND LONG
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7777 Bonhomme, Suite 1801
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(314) 862-9900

DB/DC PROJECT LEADER

We are a Fortune 500 manufacturing company seeking a Project Leader-Analyst for leadership position in DB/DC implementation using CICS and DL-1.

Candidate must have strong data base applications design experience using CICS and DL-1. Excellent communicative skills are required since user interface regarding DB requirements is essential. Excellent opportunity for growth. Compensation in twenties.

Attractive small city location in Western Pennsylvania.
Send background to:

CW Box 4971
797 Washington St.
Newton, Mass. 02160

STUDENT SCHEDULING SPECIALIST

Denver, Colorado Area

Jefferson County School District is looking for applicants who have a college degree, preferably in education or computer sciences, and four years experience in system analysis, programming, data processing user liaison, or student scheduling. Desire specific experience with the EPIC:SOCRATES scheduling system in an IBM 370/148 DOS CICS data base environment. Salary is in the $17,000-$21,000 range with an excellent fringe benefits package including four weeks vacation. Please send your resume in confidence to: **James E. Engel, Computer Services Dept., 13300 W. Ellsworth Ave., Golden, CO 80401**

SUNY FREDONIA PROGRAMMER ANALYST

If you want opportunity, a small college town and pleasant professional environment, consider the College at Fredonia. We seek a programmer analyst to develop B4700 financial applications. Require two years COBOL programming experience in accounting, budget, receivables or billing. Associate degree minimum; Bachelors desirable. On-line or data base experience a plus. Salary level $12,700 with advancement and excellent benefits. Send resume by May 9 to the Director, Computer Center, SUC Fredonia, New York 14063. SUC Fredonia is an equal opportunity/affirmative action employer.

EDP Nationwide Specialists since 1957

Client is the leading manufacturer and supplier in its field. They are undergoing rapid growth and simultaneous expansion in their EDP department. Company president and two corporate VP's began as EDP professionals within the corporation. Their need to fill the following positions is immediate.

Project Leader . . . 20-23K
High visibility. Direct 10 member team and redesign of a major system that addresses largest revenue share of their business. Manufacturing and inventory systems strength. Interface regularly with corporate senior management. 360/75 DOS shop. Familiarity with TOTAL very desirable.

Systems Analyst . . . to 20K
Broad project exposure, both manufacturing and financial. Must have participated in major systems development. Strong skills in planning and communicating. Prefer IBM background.

Systems Programmers . . . to 20K
Technical support positions for PDP 11/70 mini computer. Provide software support for on-line projects in manufacturing and administrative applications areas. Provide training support for applications, programmers and operations personnel. Applications/Systems programming and PDP 11 series minis required.

●

The above is only a partial listing of our current openings.

Please send resumes with current and desired salaries to: Bonnie Murphy

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ONE LINCOLN CENTER
Syracuse, New York 13202
(315) 422-5111
All positions are fee paid.

PROGRAMMER/ANALYSTS
SYSTEMS ANALYSTS
SR. SYSTEMS ANALYSTS

We are seeking degreed individuals with several years experience in COBOL programming and systems analysis. Sound knowledge of manufacturing business sytems helpful. Previous experience with DOS and DBOMP or OS and IMS preferred.

Fisher Controls offers excellent benefits, working conditions and professional growth within a progressive community of 28,000.

Send resume to Bob Lahr, or call (515) 754-3626.

FISHER CONTROLS COMPANY
205 S. Center St.
Marshalltown, Iowa 50158

FISHER Controls

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Systems Manager

We represent a dynamic Fortune 500 company undergoing a major MIS expansion. The nature of the organization and the change to very sophisticated systems creates this opportunity for professional career growth and development.

In this key management position you will develop systems and build staff to meet the requirements of a varied group of manufacturing and distribution divisions located across the country.

The successful candidate must have a college degree and experience in:

- Design & development of manufacturing, financial & distribution systems
- Management of large number of concurrent projects
- The ability to relate to all levels of division management
- A broad understanding of IBM computer hardware ranging from System 32's to 370's with OS/VS, CICS, IMS enviornments.

This broad-scope position with growth potential is located at the Corporate Headquarters in a Mideast-Great Lakes area. Salary commensurate with experience plus attractive benefits package. For prompt consideration send resume with salary history to: Management Consultant

CW Box 4984
797 Washington St.
Newton, Mass. 02160
An Equal Opportunity Employer M/F

DATA PROCESSING OPENINGS

Positions Openings and Qualifications Requirements

OPERATIONS ANALYSTS/SPECIALISTS

(Software Support)

Minimum 2 years experience. Assists in the installation and maintenance of S/370 operating system software and software packages. Must have a general working knowledge of the following as related to the support of computer operations. (This is NOT an operating system software programmer position).

- HASP or JES2
- OS JCL
- Assembler Language
- General knowledge of OS or MVS System internals to include assisting in performance of Sysgens, applying of PTF's and APR's.
- Background in performing studies and projects.
- Knowledge of debugging tools, i.e., Logrec, General Trace Facility

COMPUTER OPERATORS

Excellent opportunity for individuals with 2-3 years operating experience in a medium to large scale 360/370 O.S. environment. Knowledge of HASP, JCL, and CICS would be helpful.

We can offer job security with salary commensurate with skills, ability and experience. Interview and relocation expenses are paid.

Please submit resume and salary history in confidence to:
R.J. McCANN
Pennsylvania Blue Shield
CAMP HILL, PENNSYLVANIA 17011
An Equal Opportunity Employer (m/f)

SOFTWARE: Director of Technical Services

A successful, fast-growing software company, which makes a major commitment to technical support, seeks a key computer executive capable of building and directing the *finest* technical-services program in the industry.

The Job:

- Plan, organize, and direct an innovative program to deliver technical support to our more than 1,000 customers;
- Recruit and train an effective staff of technical specialists, doubling the number in the next 18 months;
- Interface with other executives in planning, developing and releasing new products;
- Control budgets and determine personnel compensation;
- Participate in top-management decisions in other areas.

The Requirements:

- Outstanding management talents, including ability to motivate, delegate authority, measure results;
- Empathy to respond to customers' needs on a worldwide basis;
- Minimum five years responsible DP systems or programming experience, with excellent IBM 360/370 experience;
- A Master's or higher degree.

The Rewards:

- Excellent salary and bonus based on performance;
- An opportunity to grow professionally in a company that values accomplishment.

If you feel you qualify, please send a resume in confidence to:

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SYSTEMS PROGRAMMERS $16K-23K

OS/VS - MVS - SVS - CICS IMS - SYSGENS!

Major client companies in Fla (8 locations), Ala. (3 locations), Carolinas' (12 locations), GA. (5 locations), Texas, Calif., Tenn, VA. Additional geographic locations available. Fortune 1000 companies. All fees and related expenses paid by companies.

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EDP DIVISION
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SYSTEMS AND PROGRAMMING SUPERVISOR

Experience in Burroughs 3700 Systems preferred

Send resumes to:

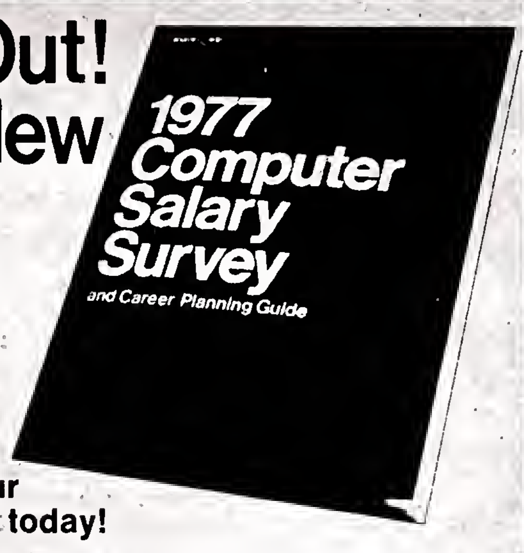
First Eastern Bank, N.A.
11 West Market Street
Wilkes-Barre, PA 18701
Attention:
Mr. Joseph F. McKeown, VP

(An Equal Opportunity Employer)

Computer Science
Faculty Teaching Position:

Ph.D. preferred. M.S. with experience will be considered. Responsibilities include teaching undergraduate courses in computer science plus development of service courses at the graduate level. Emphasis of the program is on applications rather than theoretical concepts. Salary dependent upon qualifications. Starting date September, 1977. Application deadline April 30, 1977. Submit application to Personnel Office, East Tennessee State University, Box 24070A, Johnson City, Tennessee 37601. An Equal Opportunity, Affirmative Action Employer, M/F.

Just Out! The New



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Fort Worth	817/338-9300
Houston	713/626-8705
New Orleans	504/561-6000
West Coast	
Irvine, Ca.	714/833-1730
Los Angeles	213/386-5500
Palo Alto	415/328-7155
San Francisco	415/434-2410
Torrance, Ca.	213/540-7500

source edp

(When writing, please be sure to indicate home address and current position title.)

If unable to call, write:
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First, you'll get growth potential because you'll be working with one of the fastest growing independent third party computer service companies in the industry. Raytheon Service Company has built a successful reputation for responsive, responsible total system service over the past fifteen years — and we're still growing.

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Boston
Chicago
Dallas
Detroit
New York
St. Louis
San Francisco Bay Area
Washington, D.C.
Minneapolis

If you think you qualify, send your resumé and salary history to David Murray, Raytheon Service Company, 2 Wayside Road, P.O. Box 503, Burlington, MA 01803. Or call (617) 272-9300, Ext. 302.

CUSTOMER ENGINEERING OPENINGS

SENIOR CUSTOMER ENGINEER

To handle the most complex installation, repair and maintenance tasks on a full range of major customer equipment. This senior position carries a diversity of responsibilities for major accounts and includes responsibility for training other personnel and for functioning as regional technical support specialist.

CUSTOMER ENGINEER

To install and service a variety of customer computer equipment. This includes preventive maintenance, troubleshooting, diagnostics and repair, and possibly account responsibility.

ASSOCIATE CUSTOMER ENGINEER

To service a range of computer equipment: troubleshoot and diagnose common equipment problems and make repairs — under the direction of senior service personnel.

CUSTOMER ENGINEER TRAINEE

An entry level position in customer service — to learn, under direct supervision, the troubleshooting, repair, and maintenance of customer computer equipment.

These positions require experience with IBM 360/370 systems with compatible memories: IBM plug-compatible peripherals; Honeywell 200, 2000, and 3200 systems and related peripherals.

NATIONAL TECHNICAL SUPPORT SPECIALIST

To assist in the development of business plans and equipment take-over . . . to analyze machine failures . . . to coordinate support efforts . . . and to carry on on-going review of field service staff and support requirements. Eight to ten years experience required.

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To pursue computer services sales activities in assigned territories. Compensation includes an attractive base salary plus a progressive commission plan. Candidates should have related direct sales experience.

RAYTHEON **RAYTHEON SERVICE COMPANY**

An Equal Opportunity Employer M/F

PROGRAMMER/ ANALYSTS

Mallinckrodt, Inc., a broadly diversified pharmaceutical and chemical manufacturing corporation, is searching for achievement-oriented Programmer/Analysts to meet rapid growth requirements within our Management Information Services Division.

We are seeking user-oriented people with applications experience in the manufacturing and inventory control areas. Desired background includes experience in a systems and programming group, a college degree and a working knowledge of ANSI COBOL.

Mallinckrodt is a rapidly growing, profitable corporation with an installed 370/145 using DOS/VS, CICS and DL/1.

These positions will be in our new corporate headquarters located in an attractive suburban setting in St. Louis County. We offer an excellent starting salary and comprehensive benefits programs including a dental plan.

Qualified applicants should submit resume including salary history to:
Ms. Sara E. Hamelin, Corporate Employment Dept.

Mallinckrodt

P.O. Box 5439 **St. Louis, Missouri 63147**

An equal opportunity employer, M/F

Programmer

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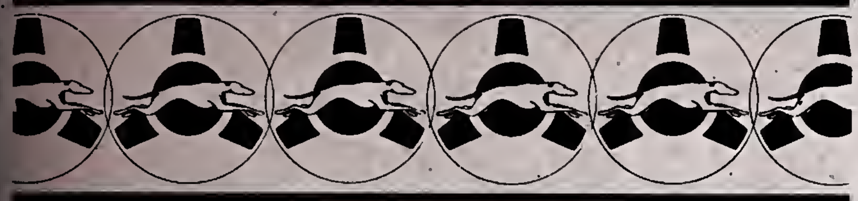

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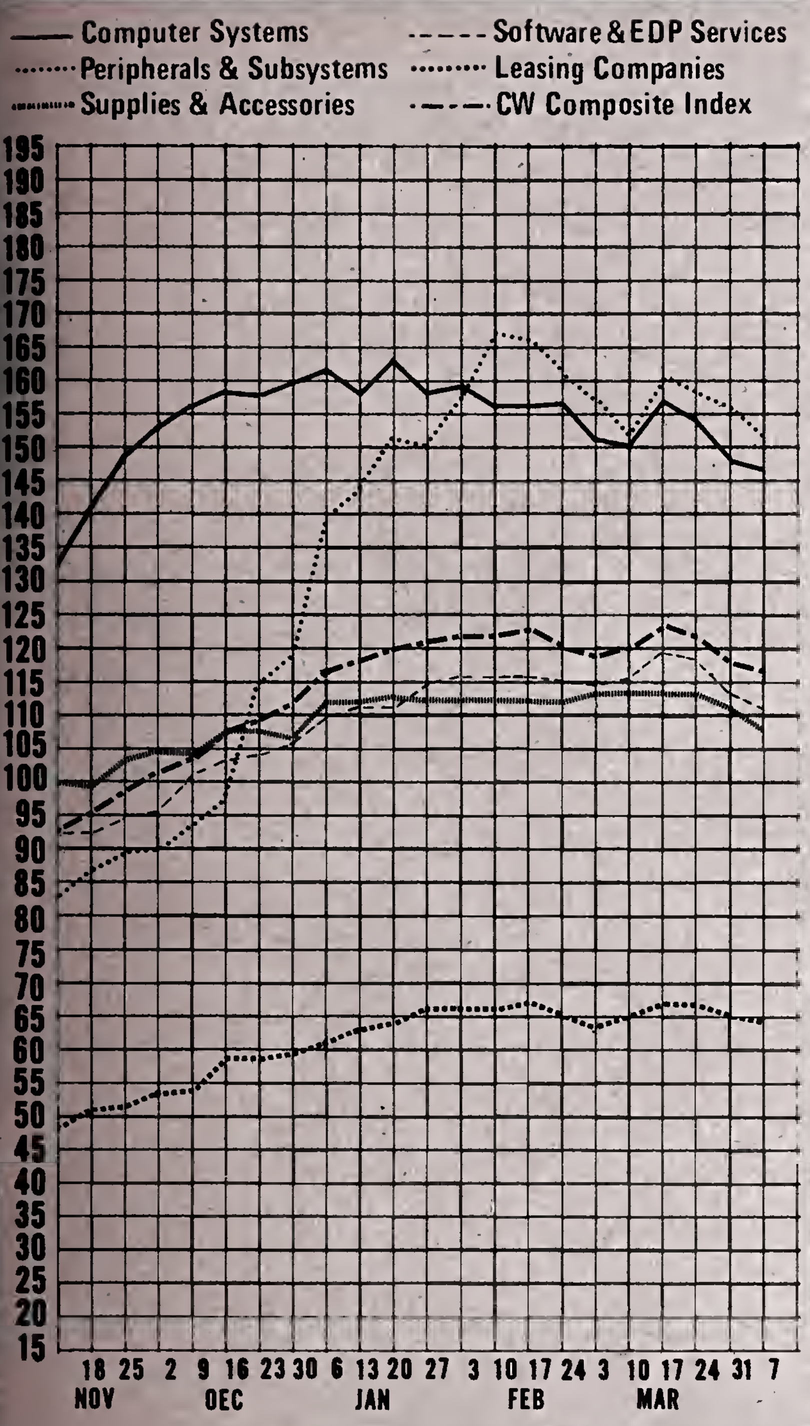

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Earnings	17,600,000	.....

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Tax Cred	32,625	.....
Eernings	390,715	177,813

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Three Months Ended Dec. 31

	1976	1975
Shr Ernd	$.29	$.14
Revenue	3,132,303	1,740,762
Eernings	357,122	171,448
9 Mo Shr	.94	.25
Revenue	9,421,995	4,239,229
Eernings	1,170,867	300,777

CUBIC
Three Months Ended Dec. 31

	1976	1975
Shr Ernd	$.64	$.53
Revenue	27,663,100	26,623,900
Eernings	1,395,300	1,165,000

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Three Months Ended Dec. 31

	1976	1975
Shr Ernd	$.33	$.27
Revenue	36,444,000	31,732,000
Earnings	4,039,000	3,353,000
6 Mo Shr	.59	.56
Revenue	72,150,000	63,817,000
Earnings	7,336,000	6,871,000

ELECTRONIC MEMORIES & MAGNETICS
Year Ended Dec. 25

	1976	1975
Shr Ernd	$1.43	.....
Revenue	91,548,000	$92,198,000
Tax Cred	1,070,000	.....
Earnings	8,746,000	(2,244,000)
3 Mo Shr	.26	.....
Revenue	26,150,000	22,155,000
Tax Cred	510,000	.....
Earnings	1,632,000	(552,000)

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Computerworld Stock Trading Summary

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CLOSING PRICES WEDNESDAY, APRIL 6, 1977

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COMPUTER SYSTEMS

EXCH		PRICE 1976-77 RANGE (1)	CLOSE APR 6 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	AMDAHL CORP	23- 40	25 1/4	- 1/2	-1.9
N	BURROUGHS CORP	61-108	61 1/4	+ 1/2	+0.8
O	COMPUTER AUTOMATION	10- 25	23 1/2	- 1/8	-0.5
N	CONTROL DATA CORP	18- 27	20 3/4	-1	-4.5
N	DATA GENERAL CORP	40- 60	41 3/4	+ 1/4	+0.6
O	DATAPOINT CORP	20- 46	21	+ 3/4	+3.7
N	DIGITAL EQUIPMENT	41- 60	41 1/2	0	0.0
N	ELECTRONIC ASSOC.	2- 5	2 1/8	0	0.0
A	ELECTRONIC ENGINEER.	7- 16	8 3/4	+ 1/8	+1.4
O	FOUR-PHASE SYSTEMS	13- 21	14 1/4	- 1/2	-3.3
N	FOXBORO	28- 51	49 3/4	+ 7/8	+1.7
O	GENERAL AUTOMATION	4- 11	6 1/4	+ 1/4	+4.1
O	GRI COMPUTER CORP	1- 1	5/8	0	0.0
N	HEWLETT-PACKARD CO	69-117	72 3/8	-2 1/2	-3.3
N	HONEYWELL INC	34- 56	47 1/8	- 1/8	-0.2
N	IBM	227-288	275 1/2	-1 1/8	-0.4
O	MANAGEMENT ASSIST	1- 9	6 1/8	- 1/4	-3.9
O	MEMOREX	17- 33	24 5/8	- 1/8	-0.5
O	MICRODATA CORP	7- 28	7 5/8	0	0.0
O	MODULAR COMPUTER SYS	3- 14	6 1/8	+ 1/2	+8.8
N	NCR	24- 38	36	- 3/4	-2.0
O	PRIME COMPUTER INC	4- 18	13 3/4	- 7/8	-5.9
N	PERKIN-ELMER	18- 27	18	+ 1/8	+0.6
N	RAYTHEON CO	45- 67	55 7/8	+ 1/2	+0.9
N	SPERRY RAND	35- 52	35 3/4	+ 1/2	+1.4
O	SYCOR INC	9- 31	10	- 1/2	-4.7
A	SYSTEMS ENG. LABS	5- 10	5 1/2	0	0.0
N	VARIAN ASSOCIATES	12- 19	16 3/4	+ 1/4	+1.5
A	WANG LABS.	11- 20	15 3/4	- 1/2	-3.0

LEASING COMPANIES

EXCH		PRICE 1976-77 RANGE (1)	CLOSE APR 6 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	BOOTHE COMPUTER CORP	1- 9	9 5/8	- 3/4	-7.2
O	COMDISCO INC	3- 13	10	- 1/4	-2.4
A	COMMERCE GROUP CORP	2- 3	2 1/4	+ 1/4	+12.5
A	COMPUTER INVSTRS GRP	1- 3	1 1/8	0	0.0
M	DATRONIC RENTAL	1- 8	1	- 1/8	-11.1
A	DCL INC	1- 2	1 1/4	0	0.0
N	DPF INC	5- 8	7	+ 1/8	+1.8
N	ITEL	6- 16	13 3/4	- 1/8	-0.9
N	LEASCO CORP	6- 22	19 1/2	- 1/4	-1.2
O	LEASPAC CORP	0- 1	1	0	0.0
O	NRG INC	0- 1	1/8	- 1/16	-24.8
A	PIONEER TEX CORP	6- 11	8 1/8	- 1/8	-1.5
N	U.S. LEASING	7- 12	10	- 3/8	-3.6

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

SOFTWARE & EDP SERVICES

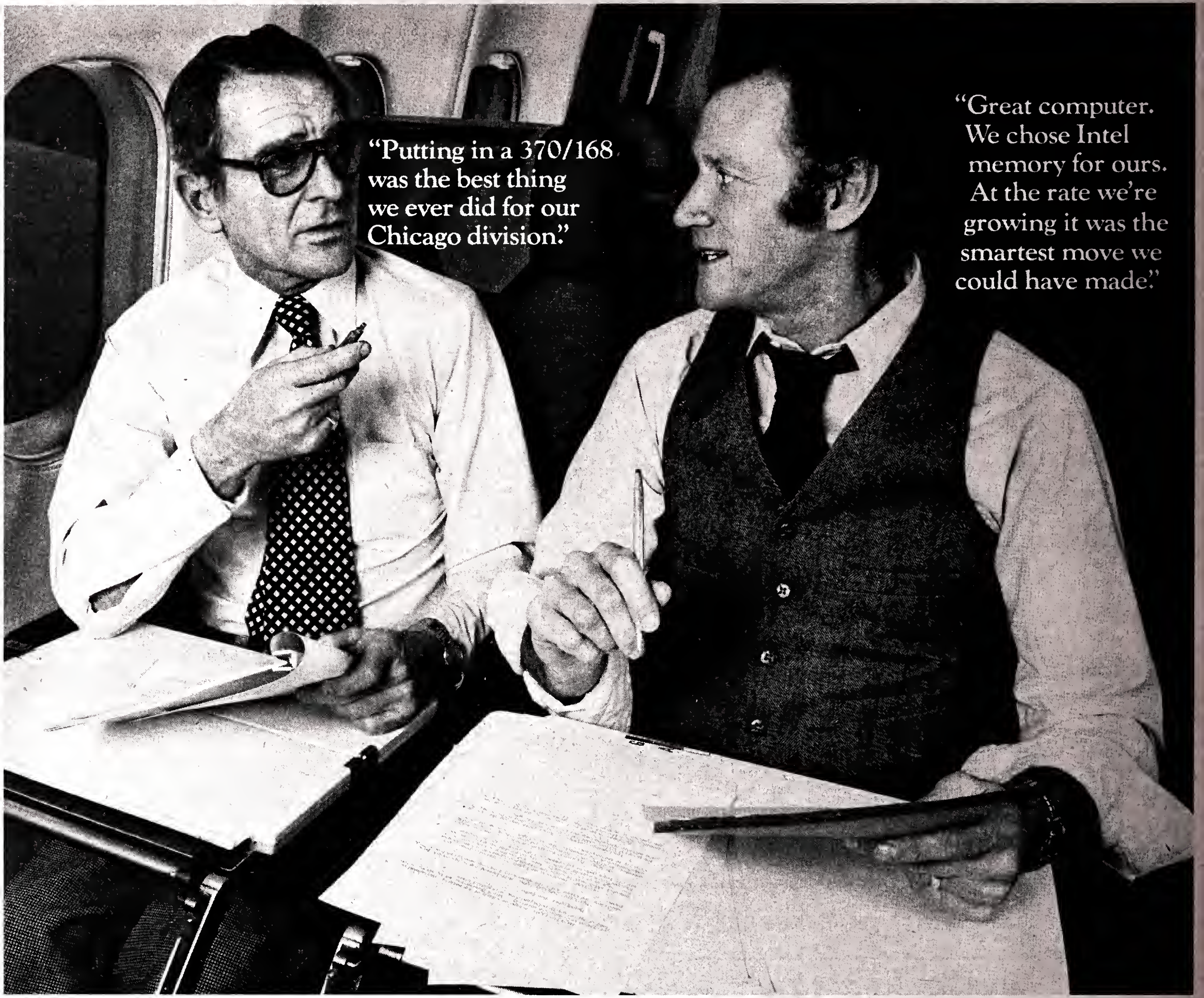
EXCH		PRICE 1976-77 RANGE (1)	CLOSE APR 6 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 3	1	- 1/8	-11.1
O	ANACOMP INC	6- 11	7 1/2	- 3/8	-4.7
A	APPLIED DATA RES.	2- 7	5 5/8	+ 1/8	+2.2
N	AUTOMATIC DATA PROC	17- 35	24 3/4	- 7/8	-3.4
O	COLEMAN AMERICAN COS	2- 6	1 5/8	0	0.0
O	COMPU-SERV NETWORK	3- 15	13 1/2	- 1/4	-1.8
O	COMP ELECTION SYSTMS	5- 9	6 1/4	- 1/2	-7.4
O	COMPUTER HORIZONS	1- 2	1	- 1/4	-20.0
O	COMPUTER NETWORK	2- 8	5 3/4	- 3/8	-6.1
N	COMPUTER SCIENCES	4- 9	7 1/2	0	0.0
O	COMPUTER TASK GROUP	1- 2	1 1/4	0	0.0
O	COMPUTER USAGE	2- 6	2 1/8	0	0.0
O	COMSHARE	2- 9	5	- 1/4	-4.7
O	DATA DIMENSIONS INC	2- 5	4 1/8	0	0.0
O	DATATAB	1- 2	2	0	0.0
N	ELECTRONIC DATA SYS.	12- 19	16 1/8	+ 1/8	+0.7
O	INFONATIONAL INC	1- 1	1/8	0	0.0
O	INSYTE CORP	1- 3	1 5/8	- 1/8	-7.1
O	IPS COMPUTER MARKET.	1- 2	3/4	0	0.0
O	KEANE ASSOCIATES	2- 4	3 1/8	+ 1/4	+8.6
O	KEYDATA CORP	1- 5	2 3/8	- 1/8	-5.0
A	LOGICON	3- 16	14 1/2	- 1/4	-1.6
A	MANAGEMENT DATA	1- 3	1 1/4	0	0.0
A	NATIONAL CSS INC	13- 25	19 1/2	0	0.0
O	NATIONAL DATA CORP	4- 7	5 1/8	- 1/4	-4.6
A	ON LINE SYSTEMS INC	17- 23	18 1/2	+ 1/8	+0.6
N	PLANNING RESEARCH	3- 5	3 3/4	+ 1/8	+3.4
O	PROGRAMMING & SYS	1- 1	5/8	0	0.0
O	RAPIDATA INC	2- 5	1 5/8	- 1/8	-7.1
O	REYNOLDS & REYNOLDS	13- 21	16 3/4	+ 1/4	+1.5
O	SCIENTIFIC COMPUTERS	1- 2	1 7/8	0	0.0
O	TYMSHARE INC	14- 28	16 3/4	- 1/4	-1.4
A	URS SYSTEMS	3- 5	4 1/8	- 1/8	-2.9
N	WYLY CORP	1- 7	1 1/2	0	0.0

PERIPHERALS & SUBSYSTEMS

EXCH		PRICE 1976-77 RANGE (1)	CLOSE APR 6 1977	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	8- 14	10 5/8	- 1/8	-1.1
O	ADVANCED MEMORY SYS	4- 10	7	+ 3/8	+5.6
N	AMPEX CORP	5- 10	8 1/8	- 1/8	-1.5
O	ANDERSON JACOBSON	2- 4	3 5/8	- 1/4	-6.4
N	APPLIED DIG DATA SYS	10- 25	11 3/8	+ 1/8	+1.1
O	BEEHIVE MEDICAL ELEC	3- 12	10 1/4	- 5/8	-5.7
A	BOLT,BERANEK & NEW	7- 11	6 7/8	- 1/8	-1.7
N	BUNKER-RAMO	5- 12	10 1/2	- 1/8	-1.1
A	CALCOMP	3- 7	3	0	0.0
O	CAMBRIDGE MEMORIES	0- 6	1	-	-5.9
N	CENTRONICS DATA COMP	20- 36	23 1/2	0	0.0
O	CODEX CORP	22- 47	46 1/4	- 5/8	-1.3
O	COGNITRONICS	1- 1	7/8	0	0.0
O	COMPUTER COMMUN.	1- 6	5 3/8	- 1/4	-4.4
O	COMPUTER CONSOLES	4- 7	4 1/4	0	0.0
A	COMPUTER EQUIPMENT	1- 3	2 1/8	- 1/8	-5.5
O	COMPUTER TRANSCEIVER	1- 3	1 1/8	0	0.0
O	COMTEN	4- 13	11 3/8	+ 1/8	+1.1
N	CONRAC CORP	20- 27	24	- 1/2	-2.0
O	DATA ACCESS SYSTEMS	1- 5	5 1/2	0	0.0
O	DATA 100	6- 13	7 3/8	- 1/8	-1.6
A	DATA PRODUCTS CORP	5- 15	10 1/8	- 1/2	-4.7
O	DATA TECHNOLOGY	1- 3	2 3/4	0	0.0
O	DATUM INC	1- 2	1 1/2	0	0.0
O	DECISION DATA COMPUT	1- 4	1 7/8	0	0.0
O	DELTA DATA SYSTEMS	1- 1	3/8	- 1/8	-25.0
N	ELECTRONIC M & M	1- 5	4 1/8	- 1/2	-10.8
O	FABRI-TEK	1- 2	1 1/4	- 1/8	-13.0
O	GENERAL COMPUTER SYS	0- 2	1/2	0	0.0
N	HAZELTINE CORP	4- 12	9 3/4	- 1/4	-2.5
N	HARRIS CORP	27- 36	35 1/2	+ 7/8	+2.5
A	INCOTERM CORP	9- 20	13 1/2	0	0.0
O	INFOREX INC	3- 7	5 1/8	+ 3/8	+7.8
O	INFORMATION INTL INC	10- 18	11 5/8	- 1/8	-1.0
O	INTEL CORP	45-109	46	+ 1/2	+1.0
A	LUNDY ELECTRONICS	3- 7	5 1/2	+1 1/8	+25.7
O	MSI DATA CORP	3- 8	7 1/2	+ 1/8	+1.6
N	MILGO ELECTRONICS	15- 37	37 1/8	0	0.0
N	MOHAWK DATA SCI	3- 10	5 1/2	- 1/8	-2.2
O	PENRIL CORP	1- 3	4 1/4	+ 3/8	+9.6
A	PERTEC CORP	3- 9	7 1/8	+ 1/8	+1.7
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	PRECISION INST.	2- 10	2	0	0.0
O	QUANTOR CORP	4- 6	4 3/8	0	0.0
O	RECOGNITION EQUIP	6- 11	7 3/4	- 1/8	-1.5
O	SCAN DATA	1- 4	1 1/8	- 1/8	-14.3
O	STORAGE TECHNOLOGY	9- 13	10 3/8	0	0.0
O	T BAR INC	5- 10	8 7/8	0	0.0
O	TALLY CORP.	4- 6	5 1/8	- 1/8	-2.3
O	TEC INC	3- 9	6 3/4	- 1/2	-6.8
N	TEKTRONIX INC	45- 69	59	- 7/8	-1.4
N	TELEX	2- 5	2 5/8	0	0.0
O	WILTEK INC	1- 2	1/8	0	0.0

SUPPLIES & ACCESSORIES

EXCH		PRICE 1976-77 RANGE (1)	CLOSE APR 6 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	BALTIMORE BUS FORMS	2- 5	2 3/8	0	0.0
A	BARRY WRIGHT	6- 13	11 1/2	- 3/8	-3.1
O	CYBERMATICS INC	0- 1	1/2	0	0.0
O	DUPLEX PRODUCTS INC	13- 24	16 3/4	- 1/8	-0.7
N	ENNIS BUS. FORMS	6- 8	6 1/8	- 1/4	-3.9
O	GRAHAM MAGNETICS	8- 14	12 1/4	- 1/4	-2.0
O	GRAPHIC CONTROLS	13- 19	14 3/4	0	0.0
N	3M COMPANY	49- 66	49 1/2	- 5/8	-1.2
O	MOORE CORP LTD	31- 51	31 1/4	-1 3/4	-5.3
N	NASHUA CORP	11- 20	15 5/8	-1 1/8	-6.7
O	STANDARD REGISTER	15- 21	19 1/4	0	0.0
O	TAB PRODUCTS CO	5- 17	15 1/4	- 1/4	-1.6
N	UARCO	19- 25	19 3/8	- 7/8	-4.3
A	WABASH MAGNETICS	4- 14	12 3/4	- 1/2	-3.7
N	WALLACE BUS FORMS	18- 25	18 1/4	- 1/4	-1.3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